WAITING EXPERIENCE AT TRAIN STATIONS

Mark van Hagen

ISBN 978-90-5972-506-5

Eburon Academic Publishers
P.O. Box 2867
2601 CW Delft
The Netherlands
info@eburon.nl / www.eburon.nl

Cover Design Iris van Hagen
Lay-out Textcetera, Rotterdam

This book has been printed on Cocoon, a FSC 100% recycled paper.

WAITING EXPERIENCE AT TRAIN STATIONS

PROEFSCHRIFT

ter verkrijging van
de graad van doctor aan de Universiteit Twente,
op gezag van de rector magnificus,
prof. dr. H. Brinksma,
volgens besluit van het College voor Promoties
in het openbaar te verdedigen
op vrijdag 1 april 2011 om 12:45 uur

door

Marcus van Hagen
geboren op 8 november 1961
te Schiedam

Dit proefschrift is goedgekeurd door
de promotor prof. dr. A.Th.H. Pruyn en
de assistent promotor dr. M. Galetzka.

PROMOTIECOMMISSIE

Prof. dr. M.D.T. de Jong, Universiteit Twente
Prof. dr. C.P.M. Wilderom, Universiteit Twente
Prof. dr. A.O. Eger, Universiteit Twente
Prof. dr. ir. A. Smidts, Erasmus Universiteit Rotterdam
Prof. dr. C.J.H. Midden, Technische Universiteit Eindhoven
Dr. ir. A.W. Veenman, professioneel bestuurder; oud-CEO van NS

The old ones speak of winter,
The young ones praise the sun.
And time just slips away.

Running into nowhere,
Turning like a wheel.
And a year becomes a day...

Ronnie James Dio, 1942-2010

FOREWORD

It was whilst I was studying geography at Utrecht University, that I became fascinated by the relationship between time and space, interlinked as they are by the speed of movement and the way they define people's range of action. During my specialization in traffic engineering at Delft University, I noticed just how immense the focus was on increasing speed. Surely that couldn't be the only solution? In the quest for the mechanism of transport choices, it slowly dawned on me that choices are not just determined by objective travel time but also by less hard qualities as ease, comfort and experience. Closer scrutiny revealed that travellers experience their journey holistically, with not the train but the stations and the access and egress transport appearing to be the weakest links. Gert-Joost Peek and the author of this book have shared their thoughts on this in a number of articles advocating a more integrated approach to moving and staying. At (railway) stations in particular, there are opportunities for synergy. Enhancing the appreciation of the waiting time at the station is one of the three strategies for improvement. What such an improvement exactly entailed was still something of a mystery to us, however. So it was defining this notion that constituted the intrinsic drive for this dissertation, one that addresses how waiting experience can be positively influenced by alterations to the waiting environment. Reading this thesis will disclose that although time can be precisely measured, we cannot perceive it with our senses. Events in the waiting environment *are* perceivable, however, and it is their intensity that influences our emotions and behaviour.

READING GUIDE

The first part of this thesis outlines the connection between waiting time and environmental experience, with practice (Chapters 1, 2 and 5) and theory (Chapters 3 and 4) alternating with each other. In the second part, a number of experiments are discussed that elucidate how the environment can positively influence waiting experience (Chapters 6, 7 and 8). The thesis rounds off with scientific (Chapter 9) and practical (Chapter 10) conclusions and recommendations. Readers who are more practically oriented are advised to read Chapters 1, 2, 5 and 10, whereas the more theoretically oriented reader may feed on Chapters 3, 4, 6, 7, 8 and 9. Pleasant reading!

CONTENTS

PART I

WAITING EXPERIENCE: THEORY AND PRACTICE

'WE WANDER FOR DISTRACTION,
BUT WE TRAVEL FOR FULFILMENT.'

HILAIRE BELLOC, 1870-1953

CHAPTER 1

THE ROLE OF THE WAIT WHEN TRAVELLING

‘WHEN YOU SIT WITH A NICE GIRL FOR
TWO HOURS, IT SEEMS LIKE TWO MINUTES.
WHEN YOU SIT ON A HOT STOVE FOR TWO
MINUTES, IT SEEMS LIKE TWO HOURS.
THAT’S RELATIVITY.’

ALBERT EINSTEIN, 1879-1955

1.1 INTRODUCTION

When undertaking an activity, people have three budgets at their disposal: money, time and effort (physical/mental). Although travel is not a primary but a secondary activity, with passengers opting for the easiest route, i.e. they wish to travel quickly, cheaply and as effortlessly as possible (Peek & Van Hagen, 2004; Van Wee & Dijst, 2002), time is more important than money when travel choices have to be made. With the level of affluence having risen, money has become less relevant; most people are materially satisfied and not only seek an emotional, non-materialistic way to spend time, but they seek quality time as well (Ackerman & Gross, 2007; Gourville, 2006; Grotenhuis, Wiegmans & Rietveld, 2007; Hermsen, 2010; Klein, 2007; Kotler & Stonich, 1991; Pine & Gilmore,1999; Van den Broek, De Haan, Harms, Huysmans & Van Ingen, 2006).
If NS (*Nederlandse Spoorwegen* – Netherlands Railways) wishes to persuade more motorists to opt for the train, it will have to heed its (potential) customers' perception of time. In the past, the most important investments were made in increasing the *objective* travel time of the trains. With calculations derived from meticulous scheduling offering insight into the extra number of passengers to be expected as a result of a quicker journey, timetable development now also aims to minimize the objective waiting time. After all, passengers are not just travelling, they are also waiting at the station for their connection (Huisman, Kroon, Lentink & Vromans, 2005; Kroon, Huisman & Maroti, 2008).

1.2 MAKING THE STATION ENVIRONMENT MORE PLEASANT

Although sufficient attention is paid in the rail sector to passengers' objective waiting time, hardly any is paid to the waiting experience. How do passengers experience their time at the station and how do they perceive their wait? Research has shown that it is the subjective (waiting) experience that is a good predictor of consumer satisfaction and how influential the waiting environment is on the time perception (Pruyn & Smidts, 1998; Smidts & Pruyn, 1994; Taylor, 1994). Although it became apparent from research conducted among several service providers that people think that the wait passes more quickly in a pleasant environment than in an unpleasant one (Pruyn & Smidts, 1998), no study has yet been carried out on the waiting experience at train stations. Stations are special environments, because time plays a central role in the service process, and as speed is of the essence, a wait is considered lost time. Moreover, a train departs at a predetermined time, which means that passengers have to keep an eye on the clock. NS is thus becoming increasingly aware of the importance of not only a fast but also a comfortable journey, both in the train and at the station, where waiting can be unpleasant. Consequently NS sets itself the following objective: *To transport our passengers safely, on time and in comfort via appealing stations.*

The rationale behind this dissertation is the awareness that waiting is a waste of time. By making the waiting environment more pleasant, NS can kill two birds with one stone: passengers will find waiting more enjoyable and the duration of the wait will seem shorter. The focus in this dissertation is thus not on the objective but on the subjective experience of time, with the practical question being: *Which measures are effective in making the waiting time at stations more pleasant and/or in shortening the perception of waiting time?*
In order to answer this question, this introductory chapter will first explore what role the service environment plays in the service process and what role time plays when undertaking a train journey.

1.3 SERVICES

A service is produced and consumed simultaneously. The consumer thus finds him-/herself 'on the shop floor', as it were, and experiences the service within the physical facilities of the organization (Grönroos, 1998). The service experience is influenced by three factors: the service processes, the people present (staff and customers) and the environment (Bitner, 1990; Zeithaml & Bitner, 2003). The processes have a strong time-bound character and efficiency is key; the more efficient and smooth the service process runs, the more satisfied the customers will be (Underhill, 1999). At a station the passengers' main focus is on time and punctuality is essential if they are to catch their train. Also the presence of sufficient and competent staff positively influences customer satisfaction, and a train journey is no exception. Not only the staff but also the presence of other people in the service environment influence how the service is experienced and too many or too few customers can result in negative feelings (Eroglu, Machleit & Chebat, 2005; Hui & Bateson, 1991; Turley & Milliman, 2000). Similarly, a deserted or a very busy station can also evoke negative emotions and avoidance behaviour. Finally, the service environment can strongly influence the perception of service satisfaction (Bitner, 1990; Pruyn & Smidts, 1998). As a service is intangible, customers often unconsciously seek things in the service environment that say something about the expected quality (Brady & Cronin, 2001; Verhoeven, Van Rompay & Pruyn, 2009). If the environment is clean, safe and appropriate for the service offered, then the consumer will have greater confidence in the quality of the service provider.

1.4 EXCEPTIONAL CIRCUMSTANCES

As customers are present when the service is carried out, they immediately notice it when something goes wrong. Whereas a smoothly running service is vital to keep customers happy, the occurrence of service failures is virtually inherent in

the provision of services (Zeithaml, Bitner & Gremler, 2006). A technical malfunction or a sudden rush of people can lead to inconvenience and extra waiting time (Tom & Lucey, 1997). In such a situation it is essential that the service provider reacts appropriately as this can yield much goodwill among its customers, sometimes even more than if the service had been rendered properly from the start (Chung, Beverland & Gabbott, 2004; Clow, Kurtz, Ozment & Ong, 1997; Hart, Heskett & Sasser, 1990; Maxham, 2001; Zeithaml & Bitner, 2003).
For NS this means that passengers confronted with a delay will experience their wait and the service differently. By correctly addressing a disruption, e.g. by taking the concerns of the customer seriously, by supplying immediate and real-time information and by paying careful attention to the waiting environment, any waiting time will be experienced as less annoying (Pruyn & Smidts, 1998).

1.5 UTILITARIAN AND HEDONIC MOTIVES

Not every customer has the same needs during the consumption of a service. In the retail sector a differentiation is made between utilitarian and hedonic consumers. Utilitarian consumers are task- and goal-oriented shoppers who are happy when they accomplish their goal, e.g. find what they are looking for. Hedonic consumers value shopping as an activity in itself; shopping is a pleasant and meaningful experience, regardless of any purchase (Babin, Chebat & Michon, 2003; Batra & Ahtola, 1991; Kaltcheva & Weitz, 2006; Wakefield & Blodgett, 1994). Babin et al. (2003) demonstrated that the environment must suit the purpose for which consumers use the service. Utilitarian consumers experience an environment differently to hedonic consumers. Babin et al. (2003) showed that when perceptual appropriateness for a group is diminished, consumers report lower positive affect, lower product quality ratings, lower perceptions of personal shopping value and fewer approach behaviours. They regard congruence of environment and goal as an important explanation for differences in appreciation of the environment between utilitarian and hedonic consumers. NS customers can have either motive. Particularly 'must motives' demand a fast and reliable service. By 'must' we mean passengers who regularly and systematically travel by train, such as commuters. For them goal-orientedness and time play an important role in transport. 'Lust' journeys, on the other hand, are only incidental (i.e. social and recreational transport whereby time plays a less prominent role). Lust passengers attach greater value to the convenience and comfort of the journey (SENTA, 2005; Steg, 2004; Steg & Vlek, 1999; Van Hagen, Peek & Kieft, 2000). The commuters who regularly travel by train are utilitarian-minded, whereas passengers who use the train for recreational purposes are more hedonic.

1.6 EXPERIENCE ECONOMY

In the last three decades, the provision of services has been the focus of numerous studies. In 2001, Chase and Dasu observed that remarkably little time had been spent on studying services from the customer's perspective and, in 1999, Pine and Gilmore ascertained that the services economy was transforming into an experience economy, i.e. the experience of the service was becoming more important than the functional qualities thereof. Pine and Gilmore's insights have been elaborated on by various authors (e.g. Beck & Davenport, 2001; Boswijk, Thijssen & Peelen, 2005; Florida, 2002; Fog, Budtz & Yakaboylu, 2005; Jensen, 1999; Nijs & Peters, 2002; Piët, 2004; Postma & Bruel, 2006; Roberts, 2004; Schmitt 2003, 2004; Thys, 2005; Wolf, 1999).
For more and more services the general tenor is that not only should a good service be rendered on a utilitarian level but that it should also include the component of hedonic experiential value. Experiential value will always be created somewhere, sometime. Pine and Gilmore (1999) compared a service with a theatre, in which the service environment is the stage, the staff are the actors and the customers the audience. With the railways the station can be seen as a stage set, with the staff as the actors. The set must serve the performance and the actors must know their role. Employees need to know what their personal contribution is to the whole. Not only must the set be well-maintained, clean and fresh but also the used materials and colours, the layout and ambiance must logically suit the function and experience of the service. Hence, whether at a station or on a platform, passengers do not expect to be confronted with graffiti, broken lights or windows, litter or the stench of urine; instead they expect a safe environment with a pleasant atmosphere in which they can spend time in an enjoyable fashion (Falk & Dierking, 1992; Keizer, Lindenberg & Steg, 2008; Pine & Gilmore, 1999; Wilson & Kelling, 1982).

1.7 THE ROLE OF TIME IN THE CHOICE OF MODE OF TRANSPORTATION

People who wish to cover a long distance can choose whether they travel by car or train, opting for that mode of transportation which they feel offers the best quality in relation to the investment of the three budgets, money, time and effort. It has become apparent from several studies (e.g. Bovy, 1994; Van Hagen, Peek & Kieft, 2000; Van der Heuvel, 1997), that when making a choice between these two alternatives, people particularly weigh up the differences in reliability, travel time, ease, comfort, experience and costs. The choice of mode of transportation is determined for 60% by the speed of both alternatives, with the fastest being favourite (Van den Heuvel, 1997; Van den Heuvel & Van Goeverden, 1993; Van Wee & Dijst, 2002). To elucidate the relevance of time when making a choice, Van den Heuvel (1993; 1997) introduced the concept *travel time factor* (or TTF). The TTF reflects the respective difference in door-to-door travel time between public transport and the car. The smaller the TTF-value, the greater the relative quality of the public transport and the greater the market share. In Figure 1.1 various TTF-values have been combined with the market share of the public transport. It shows that when the travel time is the same, public transport has a 60% share but that this decreases to 20% when the car – in comparison to the same journey by public transport – is quicker (Van den Heuvel, 1997). The difference in travel time is the most relevant for the choice between a TTF-value of 1.2 and 2.0 (area of choice).

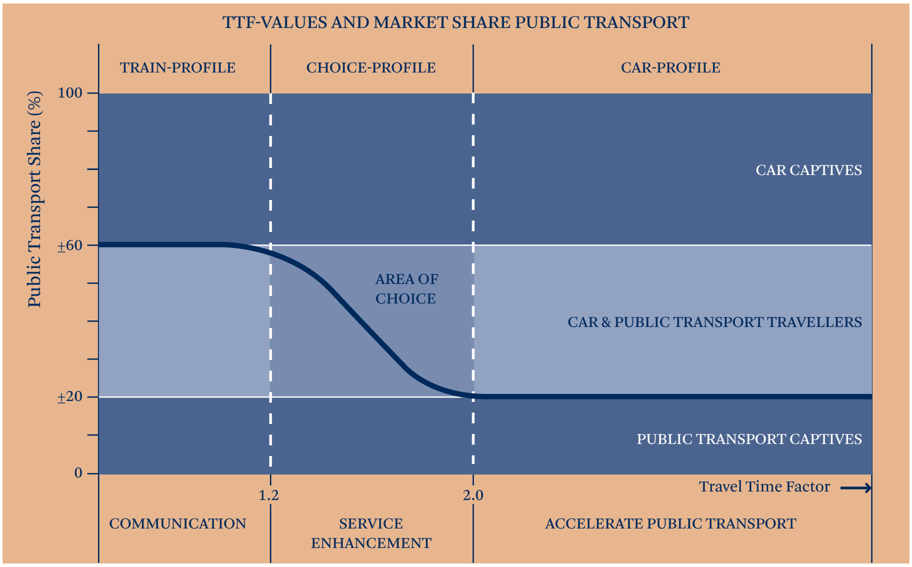


Figure 1.1 TTF-values and market share public transport (Van den Heuvel, 1997; adapted by Van Hagen, 1997)

Research into differences between objective and subjective time estimations with car and public transport to museums showed that people have a distorted idea of the actual travel time of either mode of transportation and that the subjective TTF-values appeared close to 1 (Van Hagen & Meurs, 1992; Van Hagen & Van Wissen, 1993). That travellers usually base their choice on the subjective TTF-value might lead one to assume that the public transport share would be bigger, but that appears not to be the case. This means that – besides travel time – a journey by public transport still differs from a car journey in a number of other ways. Motorists, for example, can travel directly from home to their destination, whereas train passengers have to change at the station where they can experience uncertainty and discomfort as well as be confronted with a waiting time.

1.8 THE PYRAMID OF CUSTOMER NEEDS

One obstacle in opting for rail travel is having to change trains as it has bearing on the aspects of safety, speed (travel time), convenience, comfort and experience. To remove this obstacle, attention must be paid to these aspects when designing a station as together they form the integral package of customer wishes. Analogous to Maslow's hierarchy, the various needs can be ranked according to importance in the shape of a pyramid (Maslow, 1954; Van Hagen, Peek & Kieft, 2000).
The pyramid of customer needs reflects the perception of the quality offered by NS. The base of the pyramid is formed by the basic needs *reliability* and *safety*. For passengers, safety particularly means *social* safety and this is a prerequisite for the functioning of a station as a public space. If potential customers perceive a station to be unsafe, they will avoid it. *Reliability* indicates the degree to which passengers experience receiving what they expect. If the service is not available when and where customers expect it, it will result in their being dissatisfied. As already ascertained, *speed* is the principal customer need, i.e. the majority of customers choose as short a travel time between origin and destination as possible. If the condition of a fast journey and transfer has been complied with, then the traveller wants the change to be *easy*, i.e. convenient and with little hassle. Travel information and signposting are a help and must be seen as logical and unambiguous. Also the traveller expects a certain degree of physical *comfort* at the station: sheltered waiting and seating areas and food and refreshment facilities. Finally, the need of a pleasant *experience* must be fulfilled and this is influenced by such visual aspects as architecture, design, cleanliness, used materials and colours. Besides these, however, also less tangible environmental variables, such as (day)light, smell and music influence the quality of experience. Offering facilities such as shops and cafés and the obvious presence of staff enhance a pleasant stay. Figure 1.2 shows the hierarchy in interests of the various quality dimensions (Van Hagen, Peek & Kieft, 2000; Peek & Van Hagen, 2002).

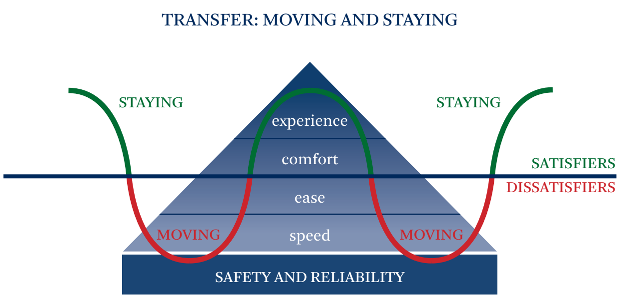


Figure 1.2 Quality dimensions in order of importance

When travellers move through the station, speed and ease are key, but when they have to stay at a station, like during a wait, then comfort and experience are vital (Wakefield & Blodgett, 1994; 1999). In this respect, speed and ease are dissatisfiers in that these quality aspects are rated negatively if they do not meet expectation (Herzberg, Mausner & Snyderman, 1959). All passengers set great store by a safe, reliable, easy and speedy journey. Such dimensions are the bedrock of transportation; they are generic and apply to each station. Comfort and experience are satisfiers (Herzberg et al., 1959; Johnston, 1985). They are noticed when the station is evaluated positively, albeit that the interpretation can vary per passenger. Just as one passenger wishes to travel first class, eat sushi at a station and admire the architecture, so is another passenger content to travel second class, eat a rissole from a vending machine and only see the station as an efficient transfer space.

Various transport scientists employ such a pyramid of customer needs. The interest layers of this pyramid are supported by several qualitative and quantitative studies. With the Stated Preference approach (*N* = 800), for example, the order of importance of quality aspects for a train journey was shown to be the same as in the hierarchy of the pyramid of customer needs (Peek & Van Hagen, 2003). Also factor analyses on different customer evaluations of train passengers (*N* = 480.000; De Bruyn & De Vries, 2009) and public transport passengers (*N* = 85.000; Van Beek & Konijnendijk, 2008; Van Beek, 2009) resulted in different quality dimensions, whereby the quality aspects at the base of the pyramid are more important than those higher up.
On the basis of group interviews with customers, Preston, Blainey, Wall, Wardman, Chintakayala and Sheldon (2008) ascertained that a 'hierarchical pyramid of needs' also exists for stations. They concluded: *'A hierarchical pyramid of needs was suggested, reinforcing the findings from the literature review. At the base of the pyramid were basic factors, such as reliability and frequency of service, and at the apex were enhancing factors such as retail and catering facilities…'* Boes (2007b) demonstrated that train passengers (*N* = 1781) at a station rank the following in order of importance: safety, uncertainty reduction, cleanliness, personal control, overview, comfort facilities, aesthetics, social contact, relaxation, privacy, spending time usefully and distraction.

1.9 DOOR-TO-DOOR APPRECIATION OF TIME

As travel is predominantly an instrumental activity, the travel time in the transport economy is considered a disutility (or travel impedance). From transport studies it appears that the time perception within a movement is not constant. In a train chain, the sequence of links are assessed differently. In transport economy terms the 'in train time' is valued the highest, the 'access and egress time' are valued twice as low, and the waiting time up to three times as low (Loehlin, 1959; Mackie, Fowkes, Wardman, Whelan & Bates, 2001; Wardman 2004). Waiting is thus the least useful way to spend time. By decreasing the wait, the passenger experiences less wasted time (Van Hagen, 1998; 2003). However, by making the waiting environment more pleasant, so too can the wait be perceived as more useful and pleasant, which in turn enhances the appreciation of the wait (Peek, 2006; Peek & Van Hagen, 2002).

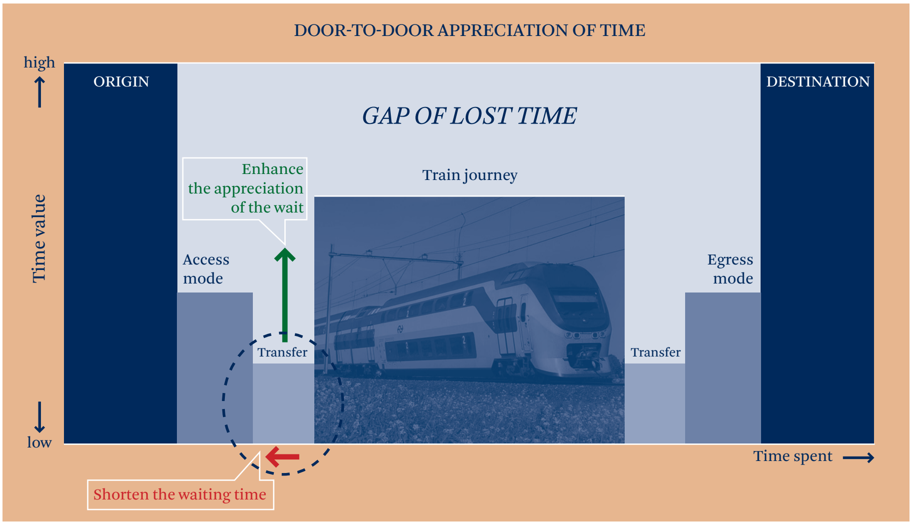


Figure 1.3 Two ways to influence waiting time: shorten the waiting time and enhance the appreciation of the wait

Figure 1.3 visualizes the appreciation of time with regard to stay and movement from origin to destination, with 'time spent' represented on the horizontal axis and 'time value', or how travellers appreciate the wait in the various links, on the vertical axis. The product of how the time is spent and how it is experienced is the value given to the activity. This appreciation can be expressed in usefulness and pleasure or, to be more specific, in a useful wait and in a pleasant wait (Peek, 2006; Peek & Van Hagen 2002; Peek & Van Hagen, 2006; Van Hagen & Peek, 2006). With service failures, the experiential value (Zeithaml, Bitner & Gremler, 2006) can be negatively influenced by the dissatisfiers (safety, reliability, speed and ease) in the same way as it can be positively influenced by the satisfiers (comfort and experience). The service can be improved by 'filling' the gap of lost time in Figure 1.3 with the aid of the following three strategies: *Acceleration*, *Concentration* and *Enhancement (ACE)*. *Acceleration* refers to the reduction of the travel time, e.g. by deploying trains with a higher frequency. *Concentration* concerns the concentration of multiple activities (e.g. working, studying, living, shopping) close to a station thus avoiding time-consuming access and egress (the X-axis in Figure 1.3). *Acceleration*

and *concentration* particularly influence the perception of (objective) waiting time. *Enhancement* of the appreciation of the wait explicitly influences the affective experience of the wait, for example by offering distraction during the stay at the station (the Y-axis in Figure 1.3; Peek & Van Hagen, 2002; 2003; Vaessens, 2005).
The basis of this dissertation is the phenomenon that in people's perception time seems to go faster or slower and that waiting is often considered tedious. We have seen that travellers particularly let their choice of transportation depend on the travel time, whereby their perception of travel time is their reality. If the perception of the negatively assessed waiting time can be shortened or made more pleasant by changing the waiting environment, it could have a positive effect on the evaluation of the journey and persuade travellers to opt for the train sooner. Making the waiting environment more pleasant can positively influence the affective waiting time and transform a wait into a stay (Klaase & Peek, 2000; Wolf, 1999).

1.10 HOW CAN WE MAKE THE WAIT MORE PLEASANT?

In collaboration with Bureau SENTA, ProRail and NS explored which aspects of a station are important for a good evaluation of the quality of stay (Pijls-Hoekstra & Munck Mortier, 2005). In the first study must and lust passengers visited several stations and had to indicate what they found pleasant or unpleasant. In a subsequent study (SENTA, 2005), the results of the qualitative exploration were tested at 40 stations among both must (N = 3099) and lust passengers (N = 4321).
From the findings it appeared that the respondents at all the stations were satisfied the most with the staff and the service but the least satisfied with the station building. They found the stations unattractive, gloomy, boring, dull, busy and noisy; they stank, were not a pleasant environment in which to have to wait and emanated no warmth (SENTA, 2005).
The study also showed that – in comparison with must passengers – lust passengers were significantly more positive about a number of experiential aspects. Lust passengers prefer to travel by train, have more confidence in it and sooner recommend train travel and visiting a station. Ultimately, lust passengers feel that they have spent their time at the station more usefully.
In a follow-up study which took the theory of Customer Relevancy (Crawford & Matthews, 2001) as its starting point, it appeared after 40 interviews and 8 group discussions that passengers define experience as: '*The degree of a pleasant wait/stay due to a pleasant environment and a certain feeling about the journey on the platform, at the station and on the train*' (Flow Resulting, 2007). From factor analyses of the quantitative phase of the Customer Relevancy study (N = 4157), it appeared that experience is divisible into two: a basic experience, with the focus on safety and cleanliness, and experience with the focus on facilities and a pleasant environment (De Bruyn & De Vries, 2009).

1.11 CENTRAL QUESTION

We have seen that passengers regard waiting at a station as extremely tedious. Furthermore, it appears that in order to improve the quality of stations, besides the traditional strategies of *acceleration* and *concentration,* also *enhancement* is an important condition for success. With particularly the experience of the environment being so poorly assessed by passengers at every station, it would seem that much can be gained here and yet it appears that there is little fundamental know-how on how to improve a station environment. Specifically, there seems to be insufficient knowledge of the effects that changing colours, light intensities, music and/or infotainment have on the emotions and behaviour of customers in a station environment. At the same time it appears that passengers see waiting time as lost time and that travel time is the decisive factor in the choice of transportation. In practice, despite paying attention to the reduction of the objective travel time, management pays hardly any to positively influencing the subjective perception of the wait.

Also the theory itself offers sufficient leads to heed the effects of waiting on customer satisfaction. Waiting is often accompanied by dissatisfaction with the service, i.e. the longer the wait, the more unpleasant it is (Larson, 1987; 1988; Katz, Larson, & Larson, 1991; Taylor, 1994; 1995; Van Houten, 1986). Waiting has a negative influence on emotions, which means that people can feel uncomfortable, uncertain, frustrated, irritated, demoralised, stressed and even frightened (Dubé-Rioux, Schmitt & Leclerc, 1988; Gardner, 1985; Katz, Larson & Larson, 1991; Maister, 1985; Osuna, 1985). Irrespective of the length of the wait, satisfaction is influenced by the waiting context. If people are actively doing something during the wait, are distracted or if they find themselves in a pleasant environment, then the wait is experienced as more agreeable (Katz, Larson, & Larson, 1991; Pruyn & Smidts, 1998). With the focus of this dissertation on making the wait in a station environment more pleasant, two effects of improvement are expected to occur:

1. Measures that change the waiting environment will have a positive effect on the experience of the wait, i.e. the length of the wait will be perceived as shorter (X-axis in Figure 1.3).
2. Measures that change the waiting environment will have a positive effect on the platform evaluation i.e. will generate positive emotions (Y-axis in Figure 1.3).

The central question is thus:

> ***What is the influence of the station environment on passengers' station evaluation, time perception and waiting experience?***

1.12 RESEARCH DESIGN

Figure 1.4 illustrates the set-up of this dissertation. After this introductory chapter, and with the aid of a qualitative (Delphi) study in various service environments (e.g. amusement park, museum, airport and hospital), Chapter 2 explores the consequences of waiting time, its related emotions and possibilities to influence the waiting experience. Chapters 3 and 4 address the theory of waiting experience and environmental experience respectively. Chapter 5 is an observation study of the time passengers spent at four train stations in the Netherlands. Besides objectively recording the (waiting) time at the station, passengers were also asked about their perception of time during their stay, how they experienced this emotionally and how they valued the station building.

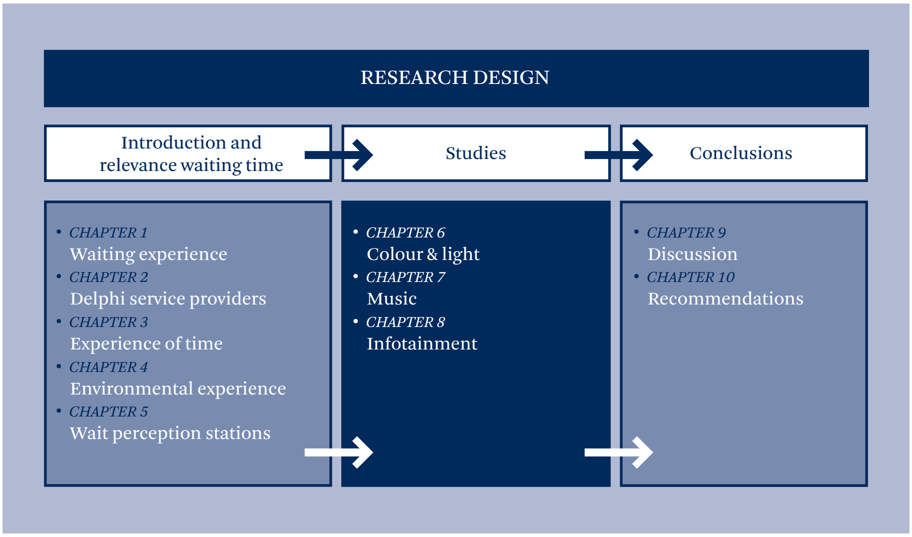


Figure 1.4 Set-up dissertation

Chapters 6, 7 and 8 describe manipulation studies in which, after altering/adapting the environment with the aid of coloured light, music and infotainment, the subsequent experiences of the respondents were recorded. For these experiments, empirical studies with manipulated music, coloured light and infotainment were conducted at regular stations. Furthermore, a virtual station was created in which the respondents, all train passengers, could move freely as avatars. For practicality's sake, the simulations were oriented towards the most frequent situations. This means that the manipulations were carried out on a platform, because that is where passengers wait the longest and because the quality of the platforms is the most negatively assessed. Here, too, the experiments departed from the idea of a normal service, without disruptions, as is the most frequent situation. As moderators, 'a hurry/rush' was simulated in the form of must and lust passengers, as was 'density' in the form of a quiet and busy station. Chapter 9 examines the overall conclusions and reflects on the research findings and the methods employed before making recommendations for follow-up research. Chapter 10 finalizes this dissertation with recommendations for Netherlands Railways.

CHAPTER 2

THE WAITING EXPERIENCE OF DUTCH SERVICE PROVIDERS

‘WAITING IS A FORM OF IMPRISONMENT. ONE IS DOING TIME, BUT WHY? ONE IS BEING PUNISHED NOT FOR AN OFFENSE OF ONE’S OWN, BUT FOR THE INEFFICIENCIES OF THOSE WHO IMPOSE THE WAIT. HENCE THE PARTICULAR RAGE THAT WAITS ENGENDERS THE SENSE OF INJUSTICE. ASIDE FROM THE BOREDOM AND PSYCHOLOGICAL DISCOMFORT, THE SUBTLE MISERY OF WAITING IS THE KNOWLEDGE THAT ONE’S MOST PRECIOUS RESOURCE, TIME, A FRACTION OF ONE’S LIFE IS BEING STOLEN AWAY, IRRECOVERABLY LOST.’

MORROW, 1984


2
B
B
4
CFF

2.1 INTRODUCTION

In Chapter 1 we saw that waiting time is an important part of the journey for train passengers but that little is still known about the experience of the wait and how it can be influenced. Before submerging ourselves in the waiting experience literature, we will explore the problems Dutch service providers experience who are also confronted with waiting times. Are they also struggling with the phenomenon of waiting, are they heeding the waiting environment, and what solutions do they have?

2.2 MAISTER'S PROPOSITIONS

Maister (1985) was the first to examine the psychological mechanisms of waiting. He presupposed that the satisfaction with the service was dependent on the perception of the wait and not just on the objective waiting time. Maister predicted that waiting is particularly annoying before the service commences (i.e. the pre-process wait) and furthermore when one is unoccupied, anxious or uncertain, when the wait seems to be unfair, when the value of what one is waiting for is low or when one has to wait alone, and when one does not understand why one has to wait at all (Figure 2.1).
Tested by various scientists, it appeared that the first seven of Maister's propositions were confirmed: waiting is tedious and seems to take longer in certain situations, such as when there is uncertainty or a lack of information (Clemmer & Schneider, 1989; Davis & Heineke, 1993; 1994; 1998; Davis & Maggard, 1990; Dubé-Rioux, Schmitt & Leclerc, 1988; Grotenhuis, Wiegmans & Rietveld, 2007; Groth & Gilliland, 2006; Hui, Thakor & Gill, 1998; Hui & Tse, 1996; Hui, Tse & Zhou, 2006; Katz, Larson & Larson, 1991; Larson, 1987; Mann, 1970; Mann & Taylor, 1969; Meyer, 1992; Pruyn & Smidts, 1992; 1993; Seawright & Sampson, 2007; Taylor, 1994). With proposition 8 it appears that waiting with others strongly depends on the context. Although group waiting can be positive, so too can negative feelings be stronger in the presence of others (Pruyn & Smidts, 1998). Davis and Heineke (1993; 1994; 1998) described how companies themselves can exert influence on the majority of the propositions by heeding the processes. Effective design of the waiting environment and well-trained staff positively influence the attitude and emotions of the customer and the waiting experience (Davis & Heineke, 1993; 1998).
Maister did not prioritize his propositions (Durande-Moreau, 1999) nor did he differentiate between various groups of customers, such as users of functional or hedonic services (Apter, 2007; Babin, Chebat & Michon, 2003; Batra & Ahtola, 1991; Kaltcheva & Weitz, 2006; Wakefield & Blodgett, 1994; 1999). We took Maister's propositions as the starting point when asking Dutch service providers about waiting experience.

Maister's Propositions

1. ***Unoccupied*** *time feels longer than occupied time*. When people having nothing to do, time seems to pass more slowly. Distraction is a good remedy.
2. ***Pre-process*** *waits feel longer than in-process waits*. Waiting before the service seems to take longer than when (one has the idea that) the service has commenced. By giving people the impression as soon as possible that the service has started, they will sooner accept the waiting time (for example, by distributing the menu at a restaurant).
3. ***Anxiety*** *makes waits seem longer*. Empathizing with the (un)realistic concern of the customer and dispelling that anxiety helps, such as the fear when it's very busy that the customer will not be able to check in on time and miss his plane.
4. ***Uncertain*** *waits are longer than known finite waits*. Waiting in uncertainty takes longer than when one is informed. When an appointment is late in starting, the *"appointment syndrome"* kicks in whereby people calmly wait until the scheduled time of the service, however long it takes. The moment this point in time has passed, people start to worry and get annoyed.
5. ***Unexplained*** *waits are longer than explained waits*. If one is aware why one has to wait, then the wait will seem shorter than if one is in the dark. Explaining why one has to wait can help, just as making sure that staff who are apparently not occupied in solving the waiting problem are out of the customers' sight.
6. ***Unfair*** *waits are longer than equitable waits*. Nothing more infuriating to those in line than a queue jumper. A fair system of *"first in, first out"* (FIFO) can prevent this.
7. *The more* ***valuable*** *the service, the longer the customer will wait*. People will tolerate a two-hour wait for a two-minute ride at an amusement park but are really annoyed if they have to wait after the service has been consumed, such as when checking out at a hotel, waiting for luggage after a flight or at the supermarket check out.
8. ***Solo*** *waits feel longer than group waits*. If one can talk to others during the wait, time will pass quicker than when one has to wait on his/her own. Encourage group processes and prevent people from having to wait on their own.

Figure 2.1 Summary of Maister's propositons (1985)

2.3 OBJECTIVE AND CENTRAL QUESTION

The objective of this chapter is to discover whether NS is alone in its struggle to make the experience of time more agreeable or whether other Dutch service providers are confronted with the same problem. How do others with waiting times approach this issue? What are they doing about it? Do they differentiate between various groups of customers and which measures do they consider the most relevant?

We expect that customers will value waiting in a more functional environment, such as an airport or a supermarket, differently to waiting in a more hedonic context, such as a museum or an amusement park. Moreover, we expect time-bound aspects to be more important with services purchased from a utilitarian perspective, just as we expect that pressure (of time) is less relevant with services consumed from a hedonic perspective (Apter, 2007; Babin, Chebat & Michon, 2003; Kaltcheva & Weitz, 2006; Wakefield & Blodgett, 1994; 1999). This leads to the following central question:

> ***How seriously do Dutch service providers view the waiting problem? Are there differences between functional and hedonic waiting situations and what possible improvements do service providers expect from shortening the waiting time and/or improving the waiting experience?***

2.4 RESEARCH METHOD

For this study we used the Delphi method (Dalkey & Helmer, 1963; Okoli & Pawlowski, 2004; Rowe & Wright, 1999), whereby experts are consulted in various steps on a specific subject with the aim of seeking consensus. The subject in this case was waiting experience. With the first step information is collected from individual experts. With the second step all the expert information is collated before it is resubmitted anonymously to the experts for reflection. The third step entails the exchange of insights between the consulted experts, after which further rounds may follow.

2.5 PROCEDURE

With waiting time being a relevant part of the service process for any organization (Pruyn & Smidts, 1993), NS took the initiative in 2007 to approach nine Dutch service providers for this study. Between 2007 and 2008 the following organizations participated: Efteling (amusement park), Schiphol (airport), Elizabeth Ziekenhuis (hospital), Jumbo Supermarkt (supermarket chain), Postkantoren BV (post offices), KLM (airline), Spoorwegmuseum (railway museum), ProRail and NS itself. In total, seventeen people were interviewed. The interviews lasted 1-2 hours and the interviewees were board members and experts with not only a broad view of the provision of services but who were also experts in the field of research, logistics, experience and marketing. A semi-structured questionnaire was used with the central question being how relevant was waiting in the provision of services and how did the organization anticipate this. Also investigated was the kind of waiting time (pre-, post- or in-process), the duration of the wait, the acceptance, employed

solutions and attention by management in the shape of time, money and effort, such as research into waiting times.
Step 1: A report made of each interview was presented to the interviewees in order to verify that their opinion had been correctly worded. Any additions and/or amendments were incorporated in a second concept that was resubmitted for approval. The report was then finalized.
Step 2: Contradictory approaches were deduced from the reports and phrased as propositions, such as whether or not music was played in the waiting environment (Efteling: yes versus Schiphol: no), or whether priority was given to certain groups (Efteling: yes versus Spoorwegmuseum: no). The interviewed experts gave individual feedback on the propositions.
Step 3: During a seminar the experts jointly exchanged views on the propositions. New information and insights resulting from this seminar complemented the previous findings.

2.6 RESULTS

2.6.1 TIME AND WAITING TIME

It became apparent from the interviews that the time consumers invest in a service provider can be divided into four groups: travel, wait, process and stay.
The ***travel time*** is the time consumers need for the journey to and from the service provider. On average consumers spend 40% of their time doing this, which corresponds with the travel time ratio for service providers as found by Dijst (Dijst, 1995; Dijst & Vidakovic, 2000).
The ***wait*** consists of the *pre- or post-wait*, i.e. before or after the service is consumed. ***Pre-wait:*** in a queue: at a checkout, counter, side-show, check-in desk, security control, ticket-dispensing machine (post office, train station, airport, amusement park) or not in a queue: for an appointment, number system (hospital, post office) or scheduled departure time (train or airplane). ***Post-wait:*** likewise in a queue (supermarket checkout) or not in a queue (airport baggage claim). The wait comprises 20% of the time invested by consumers with these service providers.
The ***process*** is the time in which the service is consumed and the customer's full attention is required for the service. At the Efteling and the Spoorwegmuseum it is the actual visit, at the hospital it is the appointment, at the post office it is the dealings at the counter, at a supermarket the checking out and with a train or plane the getting ready to board and disembark. The process comprises 10% of the total time.
The ***stay***, finally, is the time customers spend at the service provider's without participating in the service process or waiting in a queue. It is the time during which customers can move freely and undertake activities as they please. Besides the time spent at the airport or station, the stay also includes the travel time on the plane or

train. The stay comprises 30% of the total time. As the consumer spends half the time (waiting and staying) with the service provider without being involved in the service process, the quality of the stay environment is important for the customer's perception of quality.

2.6.2 LIMITING THE WAIT

With each interviewed organization, customers are confronted with certain moments in the service process when they have to wait. The experts declared that waiting too long is a dissatisfier. Waiting is not only unfavourable for the customer, but ultimately also for the service provider, on the one hand because customers who are waiting are not free to go shopping, for example, on the other hand because customers who are waiting have more negative emotions. Both result in less turnover. An expert from the Efteling: *"Let me be the first to say that a long wait is not only disagreeable but also commercially uninteresting, because someone stuck in a queue does not spend anything."* An expert from the Spoorwegmuseum remarked that waiting to pay is even more annoying than waiting to go on a ride: "*Waiting at the cash desk is even more tiresome because no one likes having to wait in order to pay. In fact what you're then doing is paying twice: in time and in money."*
It was also observed that customers themselves will do anything to make their wait as short as possible, even if it means other customers having to wait longer. To begin with, each organization attempts to reduce the waiting time to an acceptable level – not too long, but sometimes (deliberately) not too short either. A certain amount of waiting can even add value to the service, such as the building up of excitement for a feature at the Efteling. An Efteling expert: *"A visitor has to see the Python pass by at least twice before getting on. That enhances the excitement*."
The experts indicated that the total of invested time and the wait situation determine the tolerance to the wait. When the service provider shows understanding for the wait situation and does everything possible to shorten the wait and/or to make it more agreeable, the wait seems to be much more acceptable. The degree of information and the freedom of movement also contribute to the waiting experience. The better a customer is informed and the more activities (s)he can undertake whilst waiting, the better the waiting experience is evaluated. Deploying extra staff or self-service technology (SST), such as a check-in kiosk, a postage stamp or ticket machine, increases the speed of the service process and shortens the objective waiting time. Particularly the more experienced customers appreciate this.

2.6.3 INFORMATION AND ATTENTION

Providing information on the whys and wherefores of waiting, dispels much uncertainty and has a positive effect on the emotions and evaluations of customers and on the perception of the duration (Groth & Gillilian, 1999; Hui & Tse, 1996; Hui, Tse & Zhou 2006; Taylor, 1994). The interviews revealed that the most important measure to positively influence the perception of waiting time was to offer real-time, clear and reliable information. In a functional environment and with purposeful activities, the sense of control seems to be of overriding importance to the evaluation of the waiting experience. An expert from Schiphol airport remarked: *"We currently have the walking distances to the gates up on the flight departure screens. Passengers always orient themselves first, where they are and how far it is to the gate, before being receptive to exploring the airport. First the stress has to be removed; only then can the passenger start to relax."* In a hedonic waiting environment accurate information is less important. An expert from the Efteling: *"We are quite reticent about handing out maps. People have to buy them and they are not exactly ordnance survey maps either. It has to be an exciting experience to wander round the park."*

If something goes wrong in the service process and customers have to wait longer than with a functional service, the reason or the blame is soon attributed to the service provider where one finds oneself at that moment. Only with clearly external causes, such as really bad weather or a power cut, does the customer understand that the service provider could not help it. The customer is nearly always understanding of a disruption, as long as communications are clear and genuine and take the customer and his/her emotions seriously. An expert from Jumbo Supermarkets: *"It's rather a sign of the times that a long wait is soon blamed on the company where the customer is at that moment. However, if you deal with the situation adequately, you'll receive only compliments. For example, if it's really busy at Christmas and all the cash desks are open, you just walk round with a box of chocolates and liven things up. Just by indicating that you know how annoying waiting is works wonders."*

2.6.4 ENHANCEMENT

Making the waiting environment more pleasant is one way of helping customers wait more agreeably. All the organizations pay attention to architecture, interior, comfort and design. An NS expert: *"The lighting at Breda station, for example, was very expensive but the added value is that the customer him-/herself can press a button and change the lighting to cool, fab or hip after which 300 metres of concrete columns will change colour. The additional costs are less than 10% of the budget, but it is what 90% of people are talking about."* Also smell is sometimes used to positively influence the experience (Schiphol, Efteling, Spoorwegmuseum and Elizabeth Ziekenhuis). An expert at the Spoorwegmuseum remarked: *"Nothing attracts more attention than a locomotive letting off steam. The sounds and the smell of coal has associations with the olden days."* Elizabeth Ziekenhuis consciously uses smell to make time spent in the waiting rooms more agreeable and has opted for citrus aromas because both children and adults prefer these most. An expert at the hospital: *"It's important to get the dosage right. That when you come in you think: Hey, that's nice!"* Also offering distraction with music (Efteling), infotainment (post office, Schiphol), art and entertainment (Schiphol, Jumbo, NS) will put people in a better mood. An expert at Postkantoor: *"We conducted a pilot at 10 locations with info TV and it appeared from the accompanying study that waiting was assessed more positively."*

2.6.5 MUST CONSUMERS AND ENHANCEMENT OF THE APPRECIATION OF THE WAIT

The goal-orientedness of customers determines how much people dislike to wait. Must customers are goal-oriented consumers with a focus on function, efficiency and – particularly – time (Van Hagen, 1999; Van Hagen & Peek, 2006). Research by Gharbi and Nantel (2005) into shopping on the internet showed that consumers overestimate the time when under pressure. With organizations such as KLM, NS, Jumbo supermarkets and Postkantoren, who serve many customers with must motives, most of their attention is spent on physically shortening the wait (i.e. reducing the objective waiting time). Attention is focused on production management, reducing waiting time through strict management and introduction of self-service technologies (SSTs). Studies conducted in supermarkets revealed that the bulk of management attention is focused on stepping up the process (East, Lomax & Wilson, 1991; Rudolph, Pruyn & Wagner, 2002). A salient detail in our study was that the interviewees emphasized that the use of SSTs not only decreased the wait but also gave more experienced customers a greater feeling of control.

An important characteristic of the organizations who serve must motives is that time for these customers is of the essence. After all, a plane or train departs at a prescheduled moment. A dilemma when increasing the value of the stay experience is that customers must be able to feel comfortable without forgetting about the time. Must customers have to be able to keep their eye on the clock, as it were, and will take any opportunity to inform themselves. Only when they are certain they have the process under control, will they ease up on the time and be more receptive to environmental stimuli (Schiphol, KLM, NS). An expert at Schiphol: *"It is a real dilemma. On the one hand you want to let people forget the time, but on the other they have to remain alert. At the Efteling, people are receptive to all the stimuli but at the airport people's focus is somewhat narrower owing not only to the continuous attention to the time but often also tiredness."*

2.6.6 LUST CONSUMERS AND ENHANCEMENT OF THE APPRECIATION OF THE WAIT

Hedonic customers are out to enjoy, are more relaxed, pay less attention to the time and are more receptive to environmental stimuli. Organizations who serve customers with lust motives, such as the Efteling and the Spoorwegmuseum, are quite consciously engaged in managing their customers' emotions, even during the waiting situation. For lust motives the pressure of time is less relevant; it is even nice when customers can briefly forget the time.

Measures taken to make the environment more pleasant and offer distraction are particularly valued by lust visitors. Practical experience plays an important role when taking measures and their success is defined through a process of trial and error. At airports and stations besides goal-oriented travellers there are also those with hedonic motives who experience a succession of emotions during their stay.

A KLM expert referred to travellers' mood fluctuations as follows: *"At check-in the stress is high but once one has received the boarding pass and been relieved of one's luggage, then the stress declines only to rise again at customs and security. Then people relax and go shopping or eat or drink something before the stress returns briefly at the gate."*

2.6.7 MAISTER'S PROPOSITIONS REVISITED

The majority of Maister's propositions (1985) were recognized and acknowledged by the interviewed experts. Only with proposition 2 (*pre-process wait*) was it remarked that – depending on the context – *post-process waits* can certainly be just as bad as *pre-process waits*. And as for proposition 8 (group waiting), waiting together can be pleasant but also unpleasant if there is a bad atmosphere. Here, too, context is important. An expert from the Efteling on this subject: *"Waiting with others in a queue has its advantages and disadvantages. During the wait you can engage in small talk with people standing in front of or behind you, like 'Where are you from?', but you will never get too personal in a queue because there are always eavesdroppers around. It can also be quite infuriating if someone behind you keeps pushing up against you or if other people's children jump the queue."* The experts also indicated that particularly a sense of control (propositions 3, 4, 5 and 6) was important in waiting situations. If people know why and how long they have to wait, they will accept the wait much more easily. Genuine attention to the consumer's anxiety seems to have a positive influence on the waiting experience.

2.7 CONCLUSIONS

If we recapitulate the findings of the Delphi study, then it would seem wise to make the waiting environment more pleasant in every situation.
Utilitarian customers are goal-oriented and they have to keep an eye on the time and will avail themselves of any information that can help them. Only when these customers are continuously ensured that they have the process under control, will they ease up on the time (i.e. relax) and be receptive to environmental stimuli. Clear, unambiguous and real-time information on the process and a grip on the time (clocks!) is imperative for this group of customers.
Hedonic customers enjoy the stay with the service provider, are more receptive to all kinds of environmental stimuli and distractions and are barely occupied with the process. They are more relaxed and want (and are able) to forget time.

2.8 RECOMMENDATIONS: THREE STEPS OF IMPROVEMENT

The experts are unanimous in their observation that waiting is annoying. According to them, the waiting experience can be shortened or made more pleasant in three steps:

1. R***estrict the wait*** to an acceptable minimum. Self-service technologies (SSTs) can help and also offer the (experienced) customer a greater sense of control.
2. Offer ***clear and reliable information*** and take the customer seriously, particularly in a disrupted situation. Only when customers have certainty and the feeling that they have everything under control, will they be receptive to environmental stimuli.
3. ***Create a pleasant waiting environment***:
   a. by adapting the space with the aid of e.g. design, smell, colour and light, and
   b. by offering distraction such as music, infotainment and entertainment.

All of the consulted organizations pay attention to the waiting experience, particularly with regard to providing information and sometimes consciously making the environment more pleasant with the aid of design, music, colour and light, infotainment and entertainment. All, however, without any systematic approach or theoretical framework.

Organizations, such as NS, that serve both utilitarian and hedonic customers, could develop a two-track policy with which both customer groups feel welcome. This is possible by emphasizing the efficiency of services and by offering little distraction in areas where functionality is central, such as the transfer areas. Hedonic consumers pay less attention to the efficiency of the service process yet really value a lively environment. So, by offering them this, also hedonic customers will enjoy their stay.

It goes without saying, however, that as the number of service providers interviewed was limited, these findings cannot be generalized to other providers.

2.9 FROM PRACTICE TO THEORY

In this study we have seen how service providers deal with waiting situations in practice. It appeared that despite organizations paying a lot of attention to decreasing objective waiting time, they pay relatively little to the subjective waiting experience. The most significant measures concern shortening the wait and offering real-time and reliable information. With a more functional service (supermarket, hospital, aviation and rail sector), much attention is paid to the basic processes yet relatively little to improving the waiting environment. Services that are more tailored to the hedonic consumer (attraction park, museum) are much more aware of the subjective waiting experience and the role the environment plays in this. This study elucidates how improving the surroundings occurs mainly through trial and error without any fundamental theoretical framework.

We will now move on to the theory in which we will seek an answer to the question how from a theoretical framework we can optimally organize the environment in order to make the wait more pleasant. First two chapters with theory on waiting experience and environmental experience. Then in the following chapters we will discuss several studies in which the experience of both waiting time and environment are combined and where we opted for experimental field and laboratory studies in order to distinguish between cause and effect.

CHAPTER 3

THEORY OF THE WAITING EXPERIENCE

‘A DAY FULL OF WAITING, OF
UNSATISFIED DESIRE FOR CHANGE,
WILL SEEM A SMALL ETERNITY.’

WILLIAM JAMES, 1842-1910


H

3.1 INTRODUCTION

The focus in this chapter is on the waiting experience and several theories on time estimation and emotional reactions during the wait will be addressed. First the meaning of time will be set in the context of daily life in order to understand better why waiting is so tiresome.

3.2 WHAT IS TIME?

In a dissertation that is focused on the experience of waiting time, it does not go amiss to address the concept of time. All of our activities occur in time and space whereby time moves in one direction, from past to future, in a linear fashion. Whereas space is then quite tangible, time is the opposite. It is elusive. One of the most sagacious thinkers on the subject of time, Augustine (354-430), wrote in his autobiographical *Confession(e)s*: *'What then is time? If no one asks me, I know what it is. If I wish to explain it to him who asks, I do not know…'*. (Sizoo, 1940, p 271). Augustine hit the proverbial nail on the head. We live in an age when time rules our life; it is something we are *constantly* aware of, sometimes more than others. Our language is larded with time-related proverbs and references but when we have to explain what time actually is, we are at a loss for words. Time fascinates scientists and the literature on time is extensive. There is even the *International Society for the Study of Time*, a society that regularly organizes conferences following which the essays are published in *The Study of Time* series. In Volume VIII of aforesaid series, Macey estimated that the publications on time in the 20th century alone numbered 180,000 (Fraser, 1996). In fact it is difficult to think of one study in which time does not play a role, because everything is enacted in it.

3.3 OBSERVATION OF TIME

Why is it so difficult for us, just like Augustine, to define time? It is because of a number of anomalies. For people time is an intangible and abstract notion. We can observe colours, smells, sound, taste and temperature with our senses but we lack a special sense that is able to observe time. This implies that we can only indirectly deduce time from events that we perceive with our senses. Although we have an internal biological clock which can control our physical processes with the utmost precision, our consciousness has a hard time getting to grips with time (Block & Zakay, 1997; Dunlap, Loros & DeCoursey, 2004; Klein 2007; Van Bommel, 2003). The difference between biological, objective and subjective time was first identified in 1962 in an experiment in which the French geologist, Michel Siffre, had himself locked in a dark cave for 61 days without a clock. When after that period he was released, he resisted, because he thought that only 36 days had passed (Klein, 2007; Siffre, 1963). Although Siffre's biological clock more or less corresponded with the objective time, his subjective time deviated from this quite considerably (Klein, 2007). Subjective time has no fixed dimension and is influenced by thoughts, feelings, memories and expectations of activities in a specific time span (Zakay & Hornik, 1991). Consciousness produces its own time, the internal time that does not depend on the course of mechanical and biological clocks and leads to our often over- or underestimating the objective time (Klein, 2007). The only way in which we can perceive time is because things happen around us (Fraisse, 1984; Poynter, in Levin & Zakay, 1989). Through the familiar rhythm of everyday life and the fixed duration of certain activities we are able to hazard a guess at the time and how long we have been doing something. However, if this routine ceases, our time estimate soon deviates from the actual time, which is exactly what happened to Siffre in the cave. We are able to make quite a reasonable estimate, for example, when we explicitly focus our attention on the time by counting to 60. Sometimes, however, we are barely aware of the time, such as during a lively conversation or when we are totally immersed in an entertaining or challenging activity. For a brief moment we seem to forget the time, which then seems to 'fly' (Csikszentmhalyi, 1999). At other moments time seems to drag on, like when we have to do something against our will or when we are bored, like when time in the dentist's waiting room seems neverending (Hornik, 1982; 1984; Van Hagen, 2008). So, if time can be perceived both objectively and subjectively, that means we can also distinguish between objective time perception and subjective time perception. This differentiation is relevant because, as we saw in Chapter 1, it offers the possibility to influence both perceptions by shortening the waiting time on the one hand and by making the wait more pleasant on the other.

3.4 OBJECTIVE TIME PERCEPTION

Each individual experiences his/her own subjective time but the objective time perception is the same for everyone and can also be accurately measured with clocks and stopwatches. Diaries and calendars are based on objective time; they structure our lives and help us to keep our appointments. That to us is the most normal thing in the world and yet the national time, as we now know it all over the Netherlands, has only existed for a century. It was the railways that played an important role in this structuring of time. With the creation of interregional movements over the tracks and with a timetable that could be executed with minute precision, a national time became vital. Until circa 1909 each town in the Netherlands had its own clock time, but the introduction of the train with a timetable made it imperative that the clock times of various towns were synchronized; train connections would otherwise

have been impossible to plan and travellers would not know how long they had to wait (Knippenberg & De Pater, 1988; Peters, 2003).
Besides the introduction of national time, the beginning of the 20th century also saw logistics and operations research being conducted on how to more effectively deploy staff and resources in order to minimize the waiting time in minutes and seconds (Buffa & Sarin, 1987; Carmon, 1991; Kroon, Huisman & Maroti, 2008; Pruyn & Smidts, 1993; Van Dijk, 1996). The development of balanced timetables enabled passengers being able to travel more quickly and reliably, whilst the waiting times got shorter (Kroon, Huisman & Maroti, 2008; Kroon, Maroti, Helmrich, Vromans & Dekker, 2008; Van Dijk, 1996). Introducing national time and implementing the knowledge from operations research were thus the first measures with which train passengers got a better grip on the length of their wait.

3.5 SUBJECTIVE TIME PERCEPTION

By shortening waiting time we are taking the objective experience of time in hand which clarifies the expected duration of the wait. However, measures that shorten waiting time ignore the subjective experience of time. People whose waits are just as long might experience the length of time totally differently.
Subjective time can be distinguished into two parts: cognitively and affectively (Pruyn & Smidts, 1998). If someone guesses how long (s)he has waited, if (s)he finds the wait short or (un)acceptably long, then this is a cognitive assessment of the wait. If someone experiences the wait as (un)pleasant, frustrating or boring, then this is an affective assessment. It is also possible to have a certain attitude toward the wait: hedonic (pleasant time) or utilitarian (useful time).
In the scientific literature, two research streams can be identified with regard to the subjective experience of time. The first is that of the time perception and investigates people's estimation of time and how accurately they are able to guess (time) intervals. The second research stream studies the experience of time and how people cognitively and affectively experience it. We will first examine the estimation of time before discussing the affective and cognitive assessment of time.

3.6 PROTRACTED DURATION AND TEMPORAL COMPRESSION

In daily life we are usually good at estimating time on the basis of experience (*synchronicity*), but there are also special circumstances in which time seems to proceed faster or slower. These are interesting moments from which to discover how we experience time. The sociologist Flaherty went into this in depth, analysing 705 interviews in which people described situations in which time seemed to go either quickly or really slowly (Flaherty, 1993; 1999; Flaherty & Meer, 1994).

He concluded that time is only experienced as more slow (*protracted duration*) when people are strongly emotionally or cognitively involved, with complex stimuli and when they are trying to understand something difficult. Flaherty ascertained that waiting is one of the most common situations in which time seems to go slower. In contrast, the idea that time seems to be going more quickly occurs with a *flow* experience. In a moment of *flow* the purpose of the activity is clear and the concentration and sense of control optimal. In a *flow* experience action and awareness seem to become a confluence and a person becomes so involved in the activity that he loses any sense of time (Csikszentmhalyi, 1999; Farmer, 1999; Lotz, Eastlick, Mishra, & Shim, 2010). The person and the activity become a single *Gestalt* that apparently takes place in time but without the person being aware of it. Csikszentmhalyi alleges that people can only have a sense of time if they observe a certain distance to themselves. If thoughts or feelings are completely monopolized by something, then one cannot distance oneself and one's attention to the passage of time will disappear. Flaherty (1999) calls the accelerated experience of time *temporal compression*. Both he and Csikszentmhalyi (1999) identified that the sense of time only returns later and only then does one realize how long or short one has been doing something. Protracted time can thus be determined in the present, whereas accelerated time can only be established afterwards.
In recent decades several theories have been developed to explain the discrepancy between the objective and subjective experience of time, the most important of which will be briefly elaborated on below.

3.7 TOO MUCH TIME

Assimilation-contrast theory argues that when there is a discrepancy between expected and experienced duration people are inclined to (over)exaggerate the length of time. For example: "I have been waiting here for an hour!" whilst one is only too aware that it has not been longer than a few minutes. Assimilation-contrast theory also argues that when expectation and experience are close together it does not make much difference to people how long they have precisely waited. Only when the acceptable duration of the wait has been exceeded, do people get the feeling that they have had to wait much longer than the clock indicates (Luo, Liberatore, Nydick, Chung & Sloane, 2004; Nie, 2000).
Suppressing emotions as is customary/the norm in most public spaces can also result in overestimating the time. Vohs and Schmeichel (2003) have demonstrated that consciously suppressing emotions is arduous and results in overestimating the time. Vohs and Schmeichel explain this with the *ironic monitor theory* (Wegner, 1994), in which people, owing to the attention paid to their emotions, remain 'stuck in the present', the so-called *extended now*. In the *extended-now* state, people become self-conscious and aware of the time, and unconsciously and continuously

monitor whether they have their emotions under control and undesired emotions do not surface (Vohs & Schmeichel, 2003). Monitoring is implicitly keeping an eye on changes and thus also on the time, which then seems to go more slowly (Block & Zakay, 1997; Vohs & Schmeichel, 2003; Wegner, 1994). With the *assimilation* and the *ironic monitor* theories time goes too slowly for people; basically they have too much time at a moment that is inopportune for them.

3.8 TOO LITTLE TIME

Stress management theory presupposes that people under physical or emotional stress will experience any waiting time as longer (Luo et al., 2004). This means that if people are tired or in a hurry and have to wait, or have to wait in an unpleasant environment, they will experience greater physical or emotional stress and thus overestimate the wait (Nie, 2000; Taylor, 1994). Stress arises predominantly with loss of control (Averill, 1973; Klein, 2007). If information is given on the expected duration of the wait, then the consumer knows what to expect, his stress levels will decrease and he can focus his attention on other activities which in turn means his time will be efficiently spent after all (Taylor, 1994). Without information on the duration, the stress will continue, the consumer will be fixated on the wait and time will seem to drag on (Nie, 2000). In a hurried and stressed situation time goes too fast for people; basically they have too little time at a moment that is inopportune for them (Klein, 2007).

3.9 PROCESSING INFORMATION AND EXPERIENCE OF TIME

Many studies point to people's internal *timer* and the fact that they use the visible occurrences around them to estimate the time. Most theories assume that the way in which information is processed and the attention to that information has an influence on our sense of time. A few studies have been published over the years on how the process of estimating time actually works but they (seem to) contradict one another. The most important of these studies were the *storage size* model, the *contextual change* model and the *attentional* model.

3.9.1 STORAGE SIZE MODEL

Ornstein (1969) presupposed that the sense of time is a positive linear function of the complexity of the number of stimuli. He employed the metaphor of *neurological storage capacity* and alleged that time takes longer the more units of information (*discrete events*) are stored per event, the more events take place, the more events differ from one another and the more complex events are. This is also referred to as *Filled Duration Illusion* (Poynter, 1989; Poynter & Homa, 1983; Thomas & Brown,

1974). Hence a period in which nothing seems to happen seems (in retrospect) to have passed more quickly than one in which many different and complex activities took place. The more attention we pay to external stimuli, the more impressions we gather that we can remember and even more subjective time can be ascribed to all those memories whereby the period seems to have lasted longer (Hogan, 1978; Ornstein 1969).
Ornstein's hypothesis that empty time seems to pass more quickly than filled time has been corroborated not only in his own research but also in that of others (Buffardi, 1971; Burnside, 1971; Goldfarb & Goldstone, 1963; Gray, 1982; Mo, 1971; Underwood, 1975). The assumption that more complex information leads to an overestimation of the time has been confirmed in several studies (Underwood, 1975; Underwood & Swain, 1973), but rejected in others (Curton & Lordahl, 1974; Hicks & Brandige, 1974; Zakay, 1989; Zakay & Fallach, 1984; Zakay, Nitzan & Gliksohn, 1983), with the conclusion being that time was actually underestimated when the complexity of information increased.

3.9.2 CONTEXTUAL CHANGE MODEL

With four experiments, Vroon (1970) demonstrated that it was not the number of stimuli, as Ornstein (1969) alleged, but the change in stimuli and the attention paid to this that determine how many changes we can remember. The more changes, the longer time seems to have lasted (Vroon, 1970). Also Block (1978) suggested that the estimated duration is related to the number of cognitive changes, and this was later corroborated by Block and Reed (1978). *Contextual changes* form an indication of the elapsed time (Block, 2006). In essence, the *contextual change* model claims that in a retrospective situation the estimation of the duration is based on the number of changes during a specific time interval (Fraisse, 1984), or in Fraisse's words: *'Psychological duration is composed of psychological changes'* (Fraisse, 1963, p. 219). Block's contextual change model was later profoundly adapted by Poynter (1983), who then named it the *segmentation model* (Block, 1990; Poynter, 1983). According to Poynter (1983), the difference between the *contextual change* model and the *segmentation* model is that it is not the number of changes but the relevance of the changes to someone that determines how much information is consciously remembered. The quantity of information is segmented according to what is relevant information to someone and the number of segments determine the estimation of the duration. Few relevant changes have little influence on the estimation of time and many relevant changes have a good deal of influence on the estimation of time. Also applicable here is that the clearer the information has been structured, the clearer the marker of time is, the better the time segment is remembered, and the longer the estimation of time is (Poynter, 1983; 1989). Poynter and Homa (1983) and Zakay and Feldman (1991) demonstrated that when the complexity of a task and the degree of information processing were constant, it was the number of meaningful segments that determined how long the duration was estimated to be. More segments and complex information result in the longest estimation of the duration and simple information and few segments the shortest (Poynter, 1989; Poynter & Homa, 1983; Zakay & Feldman, 1991). This means that the degree of mental load and the segmentation are two different factors that individually influence the cognitive processes responsible for estimating time.

3.9.3 ATTENTIONAL MODEL

Frankenhaueser (1959) and Priestly (1968) argue that there is not a positive but a negative linear connection between information processing and the estimation of time. To this end, Frankenhaueser (1959) introduced the theory of the *attentional model*, a theory that incorporated both temporal and non-temporal information processing. This model was later adapted by Priestly (1968), Thomas and Weaver (1975) and Zakay (1989). Their premise was the commonplace assumption that it is empty time that is experienced as being unbearably long and that time in which one is totally absorbed in an activity (*flow*) seems to fly. The hypothesis that empty time seems to last longer than filled time has been substantiated by extensive research (for further literature references, see Hogan, 1978). Thomas and Weaver (1975) and Zakay (1989) hypothesized that time estimation is a cognitive process whereby each stimulus is perceived by two processors:

1. a timer that processes time information, and
2. a processor that processes timeless (i.e. not time-bound) information.

Zakay (1989) introduced the concept of *resource allocation* for the distribution of attention between temporal and non-temporal processing. Apparently, during an interval, attention can be processed in both ways. Temporal processing implies that people are consciously aware of the passing of time (for example, by guessing how long one has already been waiting). Non-temporal processing is the pondering on issues that are not time-related. The more temporal information is processed, the longer the interval seems. Pleasant surroundings, information, activities and other forms of distraction result in less information being temporally processed, which in turn reduces the perceived waiting time (Baily & Areni, 2006; Thomas & Weaver, 1975). Macar, Grondin and Casini (1994) demonstrated that when a simple task has to be executed, much attention is paid to the passing of time, whereas with a complex task the attention is bestowed on the task itself. Zakay and Block (1997) later refined the *attentional* model to the *attentional-gate* model, in which they explicitly added the fact that the cognitive timer is only set in motion the moment someone becomes aware of the time. Zakay and Block (1997) specify this as the *gate*, i.e. as if a gate is opened in people's attention that affords a view of the time (Block & Zakay, 1997; Wearden, O'Rourke, Matchwick, Min & Mears, 2010; Zakay, 2000).

3.10 RETROSPECTIVE AND PROSPECTIVE APPROACH

We have seen that the findings from different studies of time experience can yield contradictory results. In one study, for example, time was found to go faster with a difficult, complex task, whereas another study demonstrated that time then seemed to go slower (Zakay & Block, 1997).
Zakay (1989; 1993) discovered that the difference in prospective and retrospective time estimation provides a good explanation for the contradictory results. With a prospective time estimation time is central, but with a retrospective time estimation the respondent does not know that (s)he had to keep an eye on the time. In a prospective situation the respondent is thus aware of the time and his/her attention is divided between the (waiting) time and other activities. Zakay and Block (1997) postulated that if people wait for something, their attention is particularly focused on the cognitive timer and time seems to pass more slowly. If much attention is bestowed on timeless information, then time seems to go faster. This also happens when people know beforehand that they will be asked to estimate the waiting time. That is why it seems to take forever (i.e. 'a watched pot never boils'), but why we forget the time when we are engaged in lively conversation (i.e. 'time flies when you are having fun').
In a retrospective situation the brain draws on the memory in order to estimate the time, which after all we were not paying attention to. If much has happened in that time, then the time will seem to have taken longer (Block & Zakay, 1997; Zakay & Block, 1997; Zakay, 1993). We recognize this when we remember a holiday in which many activities were undertaken. In retrospect, it seems to have lasted for ages whereas at the time itself time seemed to fly. During the holiday there was no awareness of the time, and little attention was paid to it, but when we look back at it later, it is difficult to imagine that so much happened in so short a space of time (Flaherty, 1999; James, 1890; Klein, 2007). According to Block and Zakay (1997), with the storage size and segmentation model employing the retrospective method and the attentional model the prospective method, the different results can be logically explained (Block & Zakay, 1997; Zakay & Block, 1997).

3.11 DURATION AND PERSONALITY

Also personality plays a role when estimating the time. Not everyone processes information in the same manner. Hogan (1978) incorporated the personality of the respondents in his time estimation studies. Based on Eysenck's theory of personality (1970), Hogan suggested that extroverted as opposed to introverted people have a higher level of arousal and a greater need and tolerance for the processing of external stimuli. For extroverted people in an environment with few stimuli, he alleged, an interval seems to go slower than that same length of time

does for introverted people who have a lesser need and a lower tolerance for external stimuli (Eysenck, 1970; 1985). Hogan thus assumes that extroverted people need far more stimuli and get bored sooner than introverted people.
Zakay tested Hogan's theory and substantiated his finding that extroverts estimate the duration as being longer than introverts (Zakay & Fallach, 1984; Zakay, Lombranz, & Kaziniz, 1984). This endorses the attentional model, where more attention to complex tasks is at the expense of the attention paid to the time and the duration is thus estimated as being shorter. Hogan also predicted a U-curve on the basis of the *adaption level* principle, whereby the preference of stimuli increases to a certain optimum, after which overstimulation and aversion to the stimuli occurs which result in decreasing attention to the stimuli and hence the person's paying more attention to the time and estimating it as being longer. People start to get bored with too few stimuli but also with too many. They disengage themselves. Easy-listening music during a wait can decrease the perceived duration, just as complex jazz can increase it (Antonides, Verhoef & Van Aalst, 2002). Zakay and Fallach (1984) concluded that extroverts are more likely to scan the environment for stimuli and are thus also more sensitive to time stimuli in the environment, which means that also the cognitive timer receives attention. Introverts have more attention for internal information processing, cut themselves off from the environment and their attention to the cognitive timer is smaller (Zakay & Fallach, 1984). The difference in people who can tolerate many or few external stimuli could be interesting for a station environment in view of the difference between must passengers, who are expected to disengage themselves from the environment and lust passengers, whom we expect to be more receptive to environmental stimuli.

3.12 WAITING IN A STATION ENVIRONMENT

Waiting for public transport differs in a number of ways from waiting for other services. At stations passengers often wait on the platform. Platforms have a two-fold function: a transfer function and a wait/stay function. There is no queue formation on a platform nor are there any formal service rules. The waiting situation, moreover, usually takes place outdoors, with the wait itself randomly spread (Durrande-Moreau, 1999). The *pre-process wait* is regarded as the most tedious (Durrande-Moreau, 1997; 1999; Maister, 1985; Taylor 1994) and on a platform passengers are confronted with two kinds of these: the *pre-schedule wait* and the *delay*. With a pre-schedule wait the passengers are too early and with a delay the train is late. At a station passengers are per definition preoccupied with the time. As soon as one arrives, one looks at the clock to see how much time there is before the train's departure, whether it is delayed and whether there is still time to do something. Waiting in comfort on a platform is really important to passengers (Peek & Van Hagen, 2002; SENTA, 2005). At small stations the platform is the only place passengers can wait, whereas at large stations they can also spend time in the main hall, the shops, cafés or restaurants. Nevertheless, whatever the location, passengers tend to spend most of their time on the platform (Chapter 5). Having the train in direct sight reduces stress and is for many passengers the reason to opt for the platform as wait location.

3.13 STATIONS AND ATTENTIONAL MODEL

Apparent from the previous reflection is how decisive the context is in which the time estimation occurs for the over- or underestimation of the time. The degree of arousal, emotional involvement and information processing (complex or simple) and personality (introvert or extrovert) determine how much attention we are able to pay to the time and thus also how fast it seems to pass (Bar-Heim, Kerem, Lamy & Zakay, 2009). Zakay and Hornik (1991), Zakay (1989) and Pruyn and Smidts (1998) suggest that the *attentional* model is better when estimating time prospectively just as the *contextual change* model is better to estimate time retrospectively. In a wait situation people are mindful of the planned event and time awareness is key. In a wait situation on a platform, where passengers are waiting for the train, it can be expected that time seems to go slow. After all, all attention is on the time. This effect will be stronge r the less a passenger has to occupy him-/herself with. We thus expect that the focus on time can be approached from a prospective perspective. This research assumes that the *attentional* model can be applied to the waiting train passengers, whereby the challenge is to distract people from the time without their forgetting about it altogether. Through distraction we expect time in the perception of passengers to pass more quickly and their (wait) emotions to be more positive.

3.14 SENSE OF TIME CONTROL

In Chapter 2 we saw how important the sense of control is to customers. At a station this means that passengers can easily and quickly find their way and that they know where and what time their train departs. A cluttered or inconveniently arranged station and a disruption of the schedule cause loss of control of time and space and create stress. According to the principle of *think-feel-act*, *attribution theory* argues that people cannot deal with uncertainties and unexplainable events and automatically seek a reason (Averill, 1973; Diaz & Ruiz, 2002; Schmitt, 2003). Loss of control is often accompanied by (intense) emotional reactions, such as annoyance, irritation, frustration and anger (Lawson, 1965). In order to regain their sense of control with a delay, customers look for a cause. If people know and understand what the problem is, then waiting seems to be more acceptable and take less long (Kelly, 1997; Luo et al., 2004). When no cause is given, the customer attributes the cause to the service provider (Harvey & Weary, 1984; Weiner, 1980; 1985; 2000).

3.15 ACCEPTANCE DURATION OF THE WAIT

To increase the customers' acceptance of the extra wait, a rail company needs to disseminate reliable information as soon as possible on the cause and the (estimated) duration of the wait (Hui & Zhou 1996; Larson, 1987; Parthasarathy & Kumar, 2002). Zakay (1989) argues that people who have or are given information on the length of the wait will use this – in accordance with the *resource allocation* principle – as an anchor to realistically estimate the duration of the wait, and that they are usually correct. Besides offering information, the wait can also be made more acceptable by distracting one's attention from the time with other activities (Gilliland, Hofheld & Eckstrand, 1946), or as Taylor puts it: *'Though attribution for the delay can make the delayed customer more angry and uncertain, the filling of time should make the customer less angry and uncertain.'* (Taylor, 1994, p. 60). Chebat and Gelinas-Chebat (1995) recommend influencing the customers' mood with e.g. music, television and design which make the wait more acceptable (Chebat & Gelinas-Chebat, 1995; Chebat, Filiatrault, Gelinas-Chebat, & Vaninsky, 1995). The mood of passengers can be positively influenced by adding colour, music or infotainment to the station environment, and this in turn will result in a more positive assessment of the service (Hornik, 1993; Turley & Milliman, 2000).

3.16 FROM TIME EXPERIENCE TO ENVIRONMENTAL EXPERIENCE

This chapter has broached what time means to us, how our brains process events in time and how we estimate a duration. The time experience determines whether we think we have waited for a long or a short time, whether we found the wait to be acceptable and how we assessed the service. In the station environment the attentional model seems to be the best suited for explaining the subjective time estimation. The context in which the wait occurs is relevant to the way it is experienced and care must be taken that passengers do not lose control of space (orientation, crowding) and time (clocks, information). When passengers feel safe and in control they are expected to be more receptive to other activities or stimuli in the environment (Taylor, 1994). The wait can then be filled in a useful and agreeable manner (Peek & Van Hagen, 2002).

Waiting can be positively influenced by making the wait environment more pleasant. The next chapter will address the influence of the environment on how the wait is experienced. At the end of Chapter 4 the waiting experience and the environmental experience will converge in a conceptual model that will serve as a starting point for a number of field and laboratory experiments to predict how the environment influences the experience of the wait.

CHAPTER 4

THEORY OF THE ENVIRONMENTAL EXPERIENCE

‘SAYING THAT TIME IS PASSING SLOWLY IS ESSENTIALLY SAYING THAT IT IS UNPLEASANT, AND EXPRESSING IMPATIENCE WITH CONTINUING EXPERIENCE OF THE (BAD) SITUATION. ON THE OTHER HAND, PEOPLE IN A POSITIVE MOOD, ENJOYING THEMSELVES AND THEIR CURRENT STATE MAY PAY LESS ATTENTION TO TIME, AND WHEN ASKED TO ESTIMATE RECENT EVENTS, WILL RESPOND THAT TIME SEEMS TO BE PASSING MORE QUICKLY.’

HORNIK, 1992


4b
11:38
+25 minuten
Groningen
Leeuwarden

4.1 INTRODUCTION

In Chapter 1 we saw that passengers attach importance to a safe, reliable, fast, easy, comfortable and pleasant journey. In Chapters 2 and 3 we saw that the sense of control is important for a positive evaluation of the service. As we expect aforementioned aspects to also play an important role in a station environment, we will examine these further in this chapter. On discussing the phenomenon of waiting experience in Chapter 3, we saw that it was not only the duration itself but also the context in which the wait took place that are important factors in how the wait is experienced. The context is largely determined by the environment in which people wait. They perceive stimuli in the environment both consciously and unconsciously, which results in cognitive and emotional reactions that in turn can influence the evaluation of the service and people's behaviour. This chapter brings time experience and environmental experience together and shows how the wait and the waiting environment influence the waiting experience of passengers.

4.2 ENVIRONMENTAL PSYCHOLOGY

When customers are asked about the relative importance of the environment with regard to more objective variables such as travel time, opening hours, parking facilities etc., then the importance of the environment usually ends up at the bottom of the list. In in-depth interviews and with associative techniques, however, the role of the environment to consumers appears to be far more important (Dickson & Albaum, 1997; Donovan & Rossiter, 1982). Apparently, environmental psychology reveals, respondents are not very proficient when it comes to cognitively articulating how important the environment is to them. In 1985, environmental psychology was defined by Darley and Gilbert as: *'The reciprocal and interactive influences that take place between the thinking and behavior of an organism and the environment surrounding that organism'* (Darley & Gilbert, 1985, p. 949). Since 1960, much has been published by environmental psychologists on the relationship between people and their built environment (Cox, 1964; Craik, 1973; Curnhan, 1972; Frank & Massey, 1970; Kotzan & Evanson, 1969; Mehrabian, 1976; Smith & Curnow, 1966; Stokols, 1978), and it was Kotler who in 1973 was the first to use the term *atmospherics*, defining it as follows: *'The effort to design buying environments to produce specific emotional effects in the buyer that enhance his purchase probability'* (Kotler, 1973, p. 50). Kotler ascertained that, besides several service providers such as airline companies, restaurants and department stores, little was still known about the influence of the environment in which the service was offered. Many studies of environmental psychology relate to living, working, shopping, recreational or institutional environments, such as hospitals, schools and prisons, or to micro-environments, such as the shelf layout in shops (Donovan & Rossiter, 1982;

Vroon, 1970). In 1992 and much to her surprise, Bitner observed how little empirical research had been conducted on environmental factors and consumer behaviour and how few theories on the subject had been formulated. Almost two decades later in 2008, Vischer drew the same conclusion: *'User considerations are rare and unfamiliar in conventional building procurement processes, perhaps because they appear complex and elusive in comparison to the relative simple and technology-oriented tools of the builder's trade'* (Vischer, 2008, p. 239).

4.3 THE SERVICE ENVIRONMENT

In 1992, Bitner undertook a first attempt at categorizing service organizations. To this end she used two dimensions: the type of service organization, based on who performs the actions within the *servicescape* (*self-service, interpersonal service* and *remote service*) and the physical complexity of the *servicescape* (*elaborate* and *lean*). In the case of NS one can speak of an *interpersonal service,* because both consumers and employees perform actions within the *servicescape* and, owing to the large number of facilities at a station, one can speak of an *elaborate* physical complexity of the *servicescape.* The *servicescape* consists of a complex mix of environmental elements that influence internal responses and behaviour. Bitner (1992) classifies the *servicescape* into three elements:

- *Ambient conditions:* temperature, sound, music, smell, colour etc.
- *Space function:* layout, furniture, equipment etc.
- *Signs, symbols & artefacts:* signposting, style, decor etc.

Building on the work of Kotler (1973) on atmospherics, Bitner (1992) on servicescapes and Clemmer and Schneider (1989) and Taylor (1990; 1994) on the influence of waiting experience on the service evaluation, Baker and Cameron (1996) developed a conceptual model on the basis of an extensive literature study in which they indicated how delay in a service environment both directly and indirectly influences *affect*. Baker and Cameron (1996) defined the waiting environment according to Baker (1986) in three components:

- *Ambient elements*: intangible: light, temperature, sound and music
- *Design elements:* tangible/visible: colour, interior design and furniture
- *Social elements*: people: customers and staff

Studies in health environments confirm that patients appreciate light, pleasant colours, plants, art and distraction in a wait environment (Arneill & Devlin, 2002; Corey, Wallace, Harris & Casey, 1986; Devlin, 1992; Dijkstra, 2009; Ozdemir, 2010; Verderber, 1986; Verderber & Reuman, 1987). Besides magazines or TV, distraction can also consist of special elements, such as an open fireplace, an aquarium, fresh flowers or a table and chairs. Positive distraction puts people at ease and reduces stress (Arneill & Devlin, 2002; Klein, 2007; Ulrich, 1991). The *ambient* elements are taken for granted and the influence is neutral or negative. By changing the *ambient* environment, people's feelings can be subtly influenced (Donovan & Rossiter, 1982; Gardner, 1985). The *design* elements draw more attention than *ambient* ones and can be grouped according to aesthetical elements (architecture, style) that stimulate the senses and functional elements (layout, comfort, signposting) that facilitate behaviour. The *social* elements, the number of people in an environment and the interaction between customers and staff, determine together with the tangible and intangible environmental elements how comfortable customers feel in the environment (Baker, 1986; Baker & Cameron, 1996).

4.4 PROCESSING ENVIRONMENTAL STIMULI

The *servicescape* consists of a wealth of stimuli which are experienced holistically by the consumer as one single *Gestalt* (Bell, Fischer & Loomis, 1978; Bitner, 1992; Holahan, 1982; 1986; Ittelson, Proshansky, Rivlin & Winkel, 1974; Lin, 2004; Ritterfeld & Cupchik, 1996). The environment emits non-verbal signals that customers cognitively pick up (Aubert-Gamet, 1997; Baker, Grewal & Parasuraman, 1994; Bitner, 1990; Brady & Cronin, 2001; Gardner & Siomkos, 1986; Golledge, 1987; Kaplan & Kaplan, 1982; Ornstein, 1986; 1992; Rapoport, 1982; Sommer, 1969; Verhoeven, Van Rompay & Pruyn, 2009a: 2009b; Zeithaml, 1988). Whereas customers continuously notice every stimulus in the environment, the perception thereof is susceptible to selective attention, which means that not everything is consciously perceived (Lin, 2004). Particularly the *ambient* environmental elements such as temperature, music and coloured light are mostly perceived unconsciously, i.e. they only attract attention when they are absent or unpleasant, such as a temperature or sound level that is too high or too low.
Particularly with a first visit, customers seek indications that suggest or hint at the quality of the service (Zeithaml, 1988). By doing so, customers can form an opinion of the quality of the service provider, e.g. whether or not the service is cheap (Bell,1998), and whether the service provider is trustworthy or successful (Babin, Chebat & Michon, 2003; Bitner, 1990; Gardner & Siomkos, 1986; Greenland & McGoldrick, 1994; Lin, 2004; Verhoeven, Van Rompay & Pruyn, 2009b).
It is unclear how this process works and how cognition and affect influence one another. Lazarus (1982), for example, states that affect is a result of cognitive processes but others, such as Zajonc (1980), allege that it precedes cognition. The key seems to lie in the unconscious processing of environmental stimuli. Lin (2004) gives insight into this process on the basis of Gestalt psychology. In a conceptual model, she describes how cognition and emotion alternate one another step by step:

Step 1: our senses perceive environmental stimuli albeit that the majority of them are unconsciously processed by our brain. This is a cognitive processing as it is done by our brain only we are not aware of it. The brain filters out those elements that are irrelevant to the individual at that moment.
Step 2: the (unconsciously) processed stimuli initiate a (primary) emotional reaction, and
Step 3: a (possible) cognitive evaluation of this reaction follows whereupon approach or avoidance behaviour arises.

Recent (brain) research corroborates that many decisions of automated behaviour are made unconsciously (e.g. Dijksterhuis, Smith, Van Baaren & Wigboldus, 2005; Dijksterhuis, 2007; Lindstrom, 2008; Mieras, 2007; Wiers, 2007; Zaltman, 2008; Zaltman & Coulter, 1995).

4.5 STIMULUS-ORGANISM-RESPONSE MODEL

Mehrabian and Russell (1974) formulated the stimulus-organism-response (SOR) model in which environmental stimuli influence *approach* and *avoidance* behaviour via emotions (Figure 4.1).

Figure 4.1 Stimulus Organism & Response model(Mehrabian & Russell, 1974)

The environment evokes emotional reactions that influence people's behaviour (Mehrabian & Russell, 1974). *Avoidance* behaviour is all the negative behaviour evoked by the environment, such as wanting to leave, not wanting to explore the area, feeling no connection with the place and not wanting to return to it. People prefer to avoid an area they do not feel comfortable in, like an unpleasant, noisy and disorderly place (Donovan & Rossiter, 1982; Mehrabian & Russell, 1974).
Approach behaviour concerns all the positive behaviour evoked by the environment, such as wanting to stay there, exploring the area, feeling connected to the spot and wanting to return there. Approach behaviour can be stimulated by consciously chosen design and by specific addition of the correct (intangible) environmental stimuli.

Several scales have been developed to measure *emotions*, whereby a number of similar ones (emotions) are clustered in a coordinated dimension. An advantage of clustering the gamut of different emotions in more abstract dimensions is that with a small set of questions one is still able to gain a clear understanding of the emotions roused. In environmental psychology (e.g. Richins, 1997; Turley & Milliman, 2000), the emotional classification in the three PAD dimensions of Mehrabian and Russell is often used, whereby PAD stands for:

Pleasure: the degree to which a person feels comfortable or content in an environment;

Arousal: the degree to which a person is stimulated by the environment;

Dominance: the degree to which a person has a sense of control over the situation.

Each emotional experience can be seen as a combination of *pleasure, arousal* and *dominance*. In a service environment particularly the dimensions *pleasure* and *arousal* play a role, which can be visualized (Figure 4.2) in a circumplex model (Russell, 1980; Russell & Pratt, 1980). All the emotions have a place in this framework (for examples see Morris, 1995). Generally speaking, environments that are pleasant and usually stimulating are evaluated the most positively (Mehrabian & Russell, 1974).

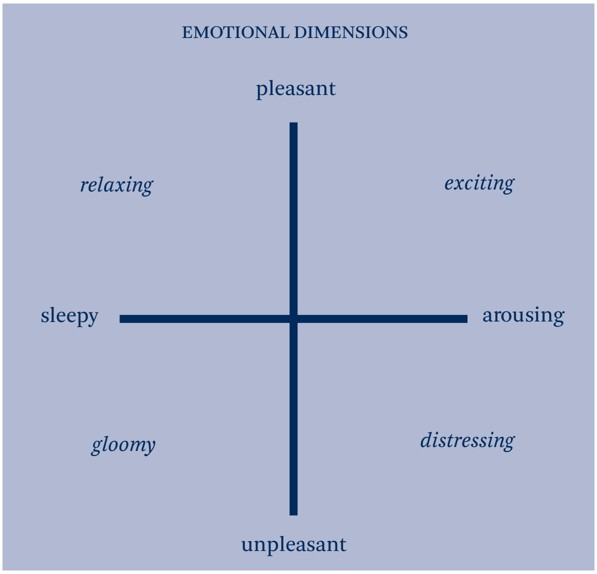


Figure 4.2 Two emotional dimensions and eight emotional states (Russell & Pratt, 1980)

Research in retail settings has shown that environmental stimuli influence customer's emotions (Yoo, Park & MacInnis, 1998), and that pleasant music, smells

and colours result in *approach* behaviour such as a return visit, friendly behaviour towards others, spending more money, staying longer and exploring the shop (Donovan & Rossiter, 1982; Gilboa & Rafaeli, 2003; Mehrabian & Russell, 1974; Sherman, Mathur & Smith, 1997). Research has also shown that when the environment is experienced as something of a surprise or concurs with expectation in terms of *arousal*, this leads to an increase in spending (Baker, Levy & Grewal, 1992; Donovan & Rossiter, 1982; Tai & Fung, 1997) and greater satisfaction (Babin & Babin, 2001; Babin, Chebat & Michon, 2003; Matilla & Wirtz; 2001). A strongly stimulating environment that is very busy leads to too much *arousal* and less pleasure (Baker, Levy & Grewal, 1992). So, the *appropriateness* of the environment is important and for utilitarian and hedonic consumers can result in different behaviour (Babin, Chebat & Michon, 2003; Foxall & Greenley, 1999). Whereas utilitarian consumers pay less attention to the environment and more to the quality of the service, hedonic consumers' approach behaviour is stimulated via *affect* by attractive surroundings (Ang & Leong, 1997; Babin et al., 2003; Baker, Levy & Grewal, 1992; Turley & Fugate, 1992; Wakefield & Blodgett, 1994, 1999).
With relatively small interventions, such as art, music or pleasant advertising, an attractive environment and thus also a useful or pleasant wait can be created (Hornik, 1992; 1993; Turley & Milliman, 2000). Such measures are reasonably easy to achieve in a station environment.

4.6 CROWDING

As we have seen, *design*, *ambient* and *social* factors determine how passengers experience and assess the environment. In stations the *social* factor is highly important because it might be either extremely busy or extremely quiet. We expect that the degree of crowding influences how people feel at a station and how they evaluate the station. The perception of crowding is a psychological frame of mind in which the demand for space is greater than the available space (Stokols, 1972). Research into perceived crowding differentiates between *human density* (crowding) and *spatial density* (Eroglu, Machleit & Chebat, 2005). Although both kinds of density interact with one another, researchers designate human density as the most important aspect of perceived crowding (Evans & Wener, 2007; Harrell, Hutt & Anderson, 1980). Crowding correlates negatively on the degree of pleasure and affects the satisfaction with the service and the behaviour (Babin et al., 2003; Eroglu & Harrell, 1986; Eroglu & Machleit, 1990; Hui & Bateson, 1991; 1992; Langer & Saegert, 1977; Machleit & Eroglu, 2000; Stokols, 1972). Crowding goes hand in hand with an increase in *arousal* and psychological stress, because people feel that they are restricted in the available space (Lawrence & Andrews, 2004; Stokhols, 1972; Wijk & Luten, 2001). Too much crowding soon leads to *attentional overload* (Bell, Fischer & Loomis, 1978; Eroglu, Machleit & Barr, 2005; Gilboa & Rafaeli, 2003).

In 2000, Turley and Milliman suggested that too little crowding could also evoke negative emotions, e.g. in a deserted bar or disco. In a hedonic environment, such as a disco, on the other hand, crowding is evaluated positively (Pons, Laroche & Mourali, 2006). So it is the context that determines whether crowding is appreciated or not.

4.7 SENSE OF ENVIRONMENTAL CONTROL

On account of its density, its complexity and the time pressure, a station can evoke feelings of uncertainty and insecurity, which slows down the time perception (Bar-Haim, Kerem, Lamy & Zakay, 2010). Research into how Dutch train stations are experienced has revealed that the reference points of passengers, such as clear/convenient organization, the flow, the visual orientation and the accessibility, do not score high (SENTA, 2005). At a station passengers have to get the train on time and we expect them to evaluate the station more positively if they experience greater control. With personal control an individual is convinced that in an environment he or she can effect a change for the better (Greenberger, Strasser & Cummings, 1989; Oldham, Cummings, Mischel, Schmidthe & Zhan, 1995). Greater control leads to greater pleasure, greater involvement, a better mood, more *arousal*, a better attitude and greater approach behaviour (Hui & Bateson, 1991; Ward & Barnes, 2001). More *arousal* in an environment experienced as negative results in an increase in the level of stress (Averill, 1973; Mehrabian & Russell, 1974). Research by Taylor (1994) into the influence of delay on feelings of uncertainty and irritation at an airport, showed a negative connection between these aspects. The longer the delay lasts, the stronger the feelings of uncertainty appear to be. Supplying information, if up-to-date and reliable, reinforces the sense of control (Hui & Bateson, 1991; Katz, Larson & Larson, 1991). Also the deployment of *technology-based self-services*, as long as they are an extra choice, can reduce the uncertainty and help to acquire more control over the service (Reinders, Dabholkar & Frambach, 2008; Reinders, Van Hagen & Frambach, 2007). On the platform passengers look for signs/pointers to determine where and when their train will leave. A good station layout and efficient information services allow passengers to orientate themselves quickly and prevents unnecessary confusion (Nie, 2000).

Despite the fact that stations are safe, objectively speaking, a station environment is experienced to be less so particularly in the evening (Boes 2007b; SENTA, 2005). So, passengers can also feel unsafe at a station. Graffiti, overdue maintenance, neglect and uncleanliness often evoke feelings of insecurity (Keizer, Lindberg & Steg, 2008; Walsh, Craik & Price, 2000; Wilson & Kelling, 1982). Indecent, excessive and illegal behaviour of others likewise result in one's feeling unsafe, particularly when one is in an unfamiliar place and both formal and informal supervision is lacking (Blöhbaum & Hunecke, 2005; Florida, 2002; Putnam, 2000; Skogan, 1990).

4.8 COMFORT EXPERIENCE

The environment influences people's physical well-being. On the basis of studied literature, Baker and Cameron (1996) ascertained that for many environmental stimuli, such as light, temperature and the volume and tempo of music, there is a basic level at which most people feel comfortable. This phenomenon has been termed as *collative dimensions*, whereby *arousal* arises through complexity, novelty and uncertainty. Too much of this affords much *arousal,* which is visualized in the inverted U-curve of Wundt (Berlyne, 1971; Wundt, 1910; Figure 4.3), and which is known as *optimal arousal theory* (Hebb, 1955; Apter, 1982; 2007). Here, *optimal* is to say an optimal presentation of stimuli for the task at hand that leads to an optimally pleasant experience, the so-called *hedonic tone* (Apter, 2007). Too few or too many stimuli result in discomfort, in feelings of negativity and in a negative perception of the wait (Baker & Cameron, 1996; Berlyne, 1971; Donovan & Rossiter, 1982; Gilboa & Rafaeli, 2003). Extreme temperatures and/or light intensity, too garish colours, uncomfortable furniture or too much density draws people out of their comfort zone (Baker, Levy & Grewal, 1992). If people feel physically uncomfortable, they will not only assess the aspects of comfort more negatively but also those aspects that have nothing to do with comfort at all (*halo effect*), such as affectively responding to strangers (Griffitt, 1970). In 1982, Donovan and Rossiter ascertained that *arousal* in an attractive (retail) setting is the ultimate mediator for the duration of the stay and they anticipated that *arousal* in very unpleasant surroundings would initiate *avoidance* behaviour.

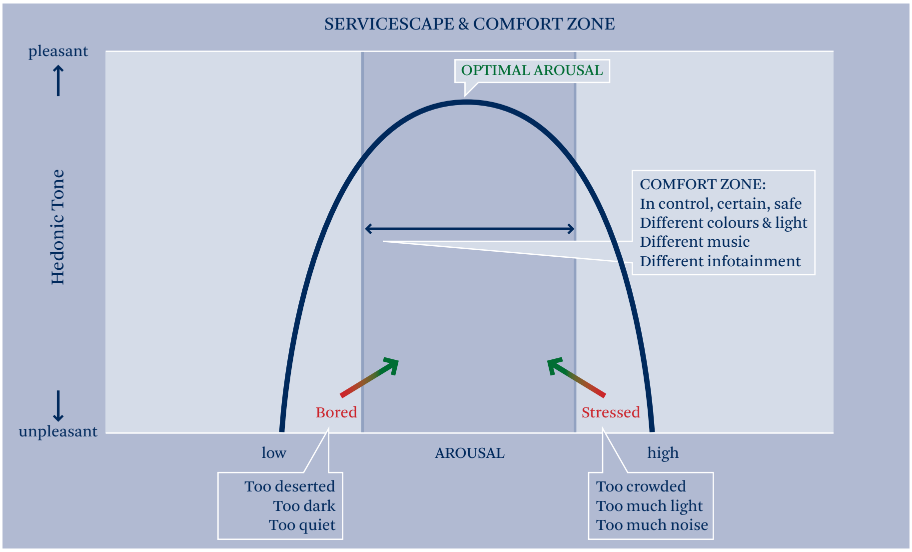


Figure 4.3 Inverted U-curve (Berlyne, 1971; Wundt, 1910)

4.9 OPTIMAL AROUSAL AND WAITING EXPERIENCE

The various theories on waiting experience in Chapter 3 can be logically linked to the theory of optimal arousal (Figure 4.4). Too few or too many stimuli result in time being experienced as taking longer (*protracted duration*), or in other words, when too much or too little happens in a period of time then it leads to unpleasant feelings and an overestimation of the duration. Too few stimuli follow *assimilation theory* and the *ironic monitor* (Luo et al., 2004; Nie, 2000), too many follow *stress management theory* (Luo et al., 2004). In the middle, people are in the comfort zone and the context (goal-orientedness, crowding) defines whether attention is on the time or on non-time-bound activities. Depending on the perspective, prospective (*attentional*) or retrospective (*storage size, segmentation*), people over- or underestimate the time.

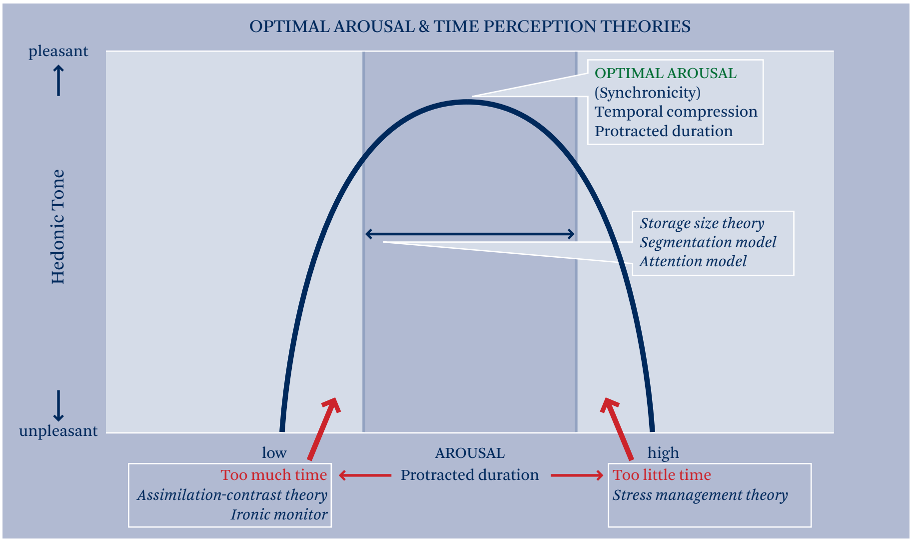


Figure 4.4 Optimal arousal theory (Berlyne, 1971) and time theories

4.10 WAITING EXPERIENCE AND ENVIRONMENTAL EXPERIENCE

Waiting has a negative influence on emotion. Usually waiting goes hand in hand with discontent with the service, whereby the longer people have to wait the more tedious it is (Hornik, 1984; 1992; Hui, Dube & Chebat, 1997; Katz, Larson, & Larson, 1991; Taylor, 1994; Van Houten, 1986). However, if people are actively engaged in something during the wait, if they are distracted or can wait in pleasant surroundings, then the wait is experienced as more pleasant (Katz, Larson, & Larson, 1991;

Pruyn & Smidts, 1998). From Pruyn and Smidts' research (1998), it appeared that the greatest irritation occurs when people have to wait relatively long, when they are in a hurry and have nothing to occupy themselves with during the wait. There is less irritation if the wait is shorter than expected and if people wait in pleasant surroundings (Pruyn & Smidts, 1993).

A negative mood has a negative influence on the waiting experience. People in a bad mood pay more attention to their bad mood than they do to external stimuli. Conversely, people in a good mood are not so preoccupied with the cause of their disposition and are more receptive to environmental stimuli. The consequence of this is that particularly people in a good mood are inclined to underestimate the waiting time (Hornik, 1993). Hornik (1984; 1992; 1993) found that people in a good mood are more future-oriented, whereas people in a neutral or negative mood were more present-oriented (*extended now*).

Baker and Cameron (1996) illustrate how the physical environment of an organization determines the perceived waiting time and in which way environmental elements can be employed to influence the perceived waiting time. With light there seems to be a basic level that is suitable for a certain task. The higher it is above this basic level, the more negative affect there is and hence the longer the perceived wait (Van Bommel, 2003). Music produces positive affect and shortens the perceived waiting time (Tom & Lucey, 1997), but the higher the volume above a desirable level, the longer the perceived wait. As for colour, the warmer it is (in terms of tint, brightness and saturation), the more negative the affect and the longer the waiting time perception (Baker & Cameron, 1996). Also for temperature applies that the further it is from an acceptable level, the more negative affect it evokes and the longer the perceived wait. In a nutshell, too much or too little (of the wrong) stimuli negatively influence the sense of well-being, causing the wait to seem to last longer.

4.11 REVERSAL THEORY

With his *reversal theory* (2007), Apter builds on optimal arousal theory, but argues that depending on the situation, there is not one but two preferred levels of stimulation: one high and one low. The state in which one finds oneself determines which level of stimulation is required. The *telic state* is the mood in which people need little *arousal*. In such a mood, people are more serious and more goal-oriented. In the *paratelic state,* on the other hand, people need more stimuli; they are more light-hearted/playful and spontaneous. In the *paratelic state* it is not the goal-orientedness but the participation in an activity that gives satisfaction. The *telic* and *paratelic states* are those people desire at certain moments. If there is tension between the desired state and the state one finds oneself in, then *avoidance* behaviour arises, just as *approach* behaviour arises when the desired situation is in sync with the experienced situation (Apter, 2007).

Figure 4.5 shows two curves that represent the systems of the *telic* and *paratelic state,* whereby the *telic state* is the *arousal avoiding* system and the *paratelic state* is the *arousal seeking* system. People can 'suddenly' switch from one state to the other due to a (sudden) event (contingency), frustration or satiation (Apter, 2007; Smith & Apter, 1977).

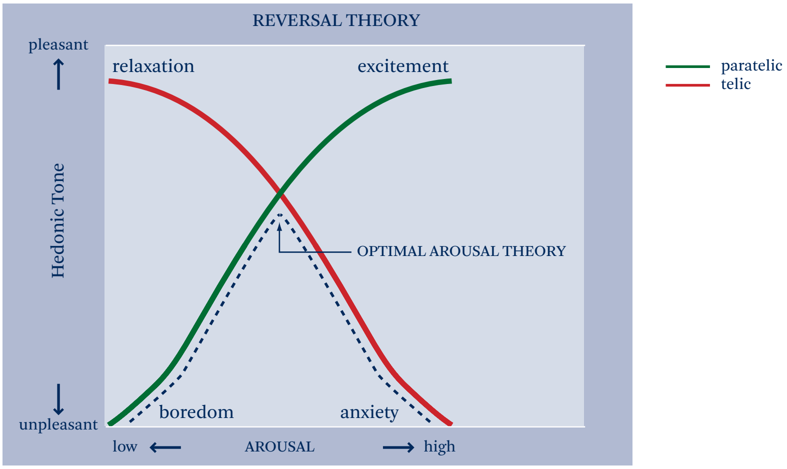


Figure 4.5 Inverted U-curve and psychological reversal (source: Apter, 2007)

Walters, Apter and Svebak (1982) have demonstrated that people wish to see soothing colours when they are anxious or relaxed and stimulating colours when they are bored or excited.

4.12 UTILITARIAN AND HEDONIC CONSUMERS

People often enter an environment with a certain purpose, which might be utilitarian (task-oriented) or hedonic (recreational) (Batra & Ahtola, 1991; Foxall & Greenley, 1999; Katcheva & Weitz, 2006; Umesh, Pettit & Bozman, 1989; Westbrook & Black, 1985). Task-oriented consumers process environmental stimuli particularly cognitively (Wakefield & Blodgett, 1994; 1999), and they have an extrinsic orientation whereby satisfaction arises when they accomplish their goal. Those who shop for pleasure in a complex and highly stimulating environment (*high arousal*) appreciate the surroundings more than those who are goal-oriented shoppers (Kaltcheva & Weitz, 2006; Westbrook & Black, 1985). Recreational consumers process environmental stimuli particularly affectively (Wakefield & Blodgett, 1994; 1999), and they have an intrinsic orientation whereby participating in the activity itself gives satisfaction (Deci, 1975; Deci & Ryan, 1985). Besides the motivational orientation,

also the familiarity with the surroundings and the available time will influence how the environment is assessed.
People with little time or who are unfamiliar with the station will have a greater task-related orientation than those who know the place well or who are not in a hurry. Task-oriented consumers appear to get irritated more quickly and are sooner dissatisfied when the environment is different than expected, whereas customers with a recreational motive appreciate different surroundings per definition (Machleit & Eroglu, 2000). Not only do utilitarian consumers want to spend as little energy on an activity as possible, but also as little time as possible. Hedonic consumers are less time-sensitive (Davis, 1991; Davis & Heineke, 1998; Davis & Vollmann, 1990; Luo et al., 2004; Osuna, 1985). In 1976, Harell and Hutt suggested that people who are impatient or time-sensitive react more affectively to crowding in a shop than those who are not. In this way, a traveller in a hurry might perceive the environment differently to someone with all the time in the world. Waiting under pressure, moreover, seems to have the greatest influence on the satisfaction with the service (Davis & Heineke, 1998; Davis & Vollmann, 1990; Harell & Hutt, 1976; Machleit, Eroglu & Mantel, 2000, Nie 2000; Unzicker, 1999), and results in time being overestimated (Gharbi & Nantel, 2005). The task-related and recreational orientation can also be found amongst people at train stations, namely as lust and must passengers (Chapters 1 and 2). Boes (2007a) demonstrated that with Dutch train passengers ($N = 1781$) it was must passengers who appeared to find the aspects of privacy, spending time usefully, peace, waiting alone, a fast flow and knowing how to get to the platform more important than lust passengers did. Lust passengers, on the other hand, find facilities, service, a warm atmosphere, sufficient and comfortable seating and a sense of control more important. Lust passengers have more requirements that are connected to recreation, whereas must passengers have more requirements that are connected to speed and functionality (Boes 2007b; Davis & Heineke, 1998; Davis & Vollmann, 1990; Kaltcheva & Weitz, 2006; Van Hagen, De Gier & Visser, 2005). Ang and Leong (1997) expect must passengers to be less receptive to extra environmental stimuli and lust passengers to be quite the opposite.

4.13 DIFFERENCE BETWEEN PEOPLE WITH REGARD TO SENSITIVITY TO ENVIRONMENTAL STIMULI

With the *optimal arousal curve* in Paragraph 4.9 we could see that the environment influences people's cognitive, emotional and physical state. All the same, not every individual reacts identically in the same environment. It all depends on moderating variables such as personality and situation. One person might be more *arousal*-oriented and able to tolerate more stimuli than another, and yet even that can change from situation to situation. Extroverted people appear to be more receptive and perform different tasks better with background music than introverted people

(Furnham & Allass, 1999). In Chapter 3 we could see how differently extroverts and introverts experience the time (Hogan, 1978). Mehrabian and Russell (1974) distinguish between *screeners* and *non-screeners*, with the *screeners* filtering out many environmental stimuli and *non-screeners* being more receptive to environmental stimuli (Dijkstra, Pieterse & Pruyn, 2008; Donovan & Rossiter, 1982; Mehrabian & Russell, 1974). It is the situation that dictates whether people are *screeners* or *non-screeners.* With a raised level of arousal, goal-oriented consumers are unable to perceive more cues around them (Easterbrook, 1959), filter out more information and are sooner bothered by crowding than those who are not goal-oriented (Donovan & Rossiter, 1982; Eroglu & Machleit, 1990; Kaltcheva & Weitz, 2006; Lewin, 1943). With the aforementioned reversal theory we saw that task-related consumers in the serious and goal-oriented *telic* mode can bear fewer stimuli than recreational consumers who find themselves in the less serious and more light-hearted *paratelic* mode (Apter, 2007; Kaltcheva & Weitz, 2006).

4.14 REVERSAL THEORY AND MOTIVATIONAL ATTITUDE

If we combine reversal theory with the perspective of utilitarian and hedonic consumers, then we should be able to place the must and lust passengers in two situations. The must passengers are in the *telic state* and are mainly preoccupied with information processing and watching the time. They are possibly less receptive to environmental stimuli and hanker for a lower level of arousal. Lust passengers are in the *paratelic state,* are expected to be more receptive to the environment and value a higher level of stimulation more. It is expected that lust passengers will show more *approach* behaviour in entertaining company with music and warm colours. However, that same kind of company, music and stimulating colours can form a barrier to goal-oriented must passengers, who in such a situation are expected to show more *avoidance* behaviour. Moreover, because they are more sensitive to time and more in a hurry, must passengers will get irritated or anxious sooner by a delay. They want to leave as soon as possible.
Figure 4.6 shows that must passengers can find themselves in the situation of *anxiety* and aspire after the optimum of *relaxation*. Lust passengers, on the other hand, can find themselves in the *boredom* mood and hanker after the optimum of *excitement*. However, in accordance with optimal arousal theory, both groups can also experience too many or too few stimuli, as is visualized on the right and left side of the parabola in Figures 4.3 and 4.6.

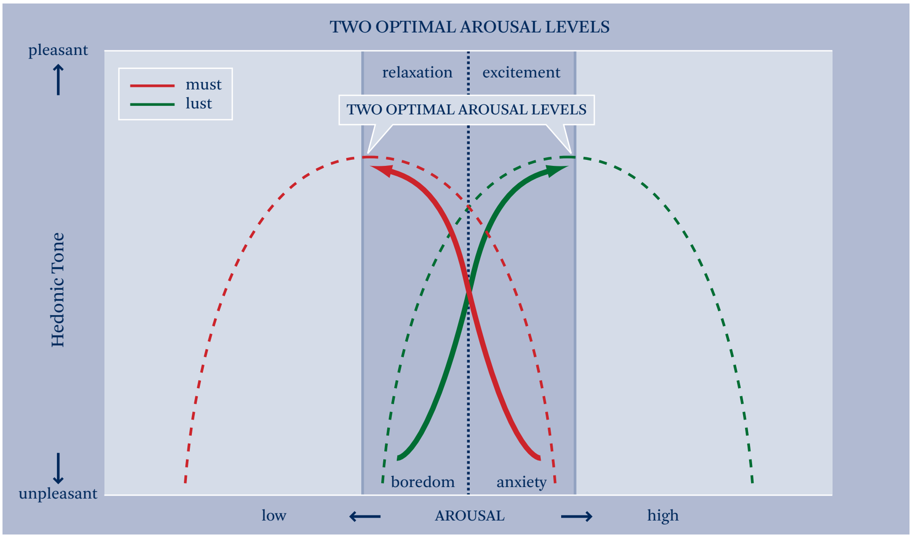


Figure 4.6 Optimal arousal theory, psychological reversal and must and lust passengers (after Apter, 2007)

4.15 CONCLUSION

In Chapter 3 we saw that people's attention is divided between activities that are/are not timebound (Zakay, 1989). Much proof was moreover found in the literature for a negative relationship with waiting time perception, affect and the evaluation of the service (Clemmer & Schneider, 1989; Hornik, 1984; Katz et al., 1991; Pruyn & Smidts, 1998; Taylor, 1994). In this chapter we have seen that the environment is to a large extent perceived unconsciously (Dijksterhuis, Smith, Van Baaren & Wigboldus, 2005), and that the environment influences cognitive, affective and behavioural reactions. In this dissertation we follow the line of reasoning of Baker and Cameron (1996), who make a connection between the service environment, affect and waiting time perception with a delay on the basis of the SOR model of Mehrabian and Russell (1974). In their model, Baker and Cameron integrate the cognitive timer model (Zakay, 1989) and conclude that affect has an impact on the service environment which influences the waiting time perception, whereby too many or too few stimuli evoke negative feelings causing the wait to seem to last longer.

The SOR model (Mehrabian & Russell, 1974) is the starting point for the studies of this dissertation with the ***stimuli*** from the station environment inducing emotional and cognitive reactions via the senses and initiating ***approach*** or ***avoidance*** behaviour. In the ***organism*** the stimuli are processed cognitively and affectively. Two streams can be distinguished, whereby the attention is divided in accordance with the ***attentional model*** (Zakay & Block, 1997) between time-bound and

non-time-bound stimuli. It is expected that the waiting experience is more negative when attention is consciously focused on the time. Various stimuli have been used as input in the studies that can be placed in front of the model as a kind of filter. On the one hand these are ***ambient*** variables, such as music, coloured light, which have an influence during the wait via *pleasure, arousal* and *dominance* on the waiting time perception and the waiting experience. On the other hand, ***design*** elements are capable of distracting one from the time and making the wait more pleasant. Advertising and infotainment can be deployed as explicit distractors.
Our studies will take the following moderating variables into account: the duration of the wait and the ***social*** environment variables: must and lust passengers and 'degree of density'.
Passengers who are waiting for a train are aware of the waiting time and – in accordance with the *attentional model* – it is expected that they will overestimate the duration of the wait. Furthermore, we expect passengers, who think their wait has been short, to be more positive and thus find the wait more acceptable, to experience their wait as useful and pleasant, to evaluate the duration of the wait and the platform more positively and show more approach behaviour. Finally, we expect to see a moderating effect for the degree of density on the platform. (Must) passengers will be less receptive to environmental stimuli in a dense crowd in comparison with (lust) passengers in a quiet situation. In such a case we expect reversal theory to be applicable (Apter, 2007; Walters, Svebak & Apter, 1982).

Before discussing the studies examining the influence of the environment on the station and waiting experience, Chapter 5 will first address a study in which we ascertained what length of time passengers actually spent at a station, how long they waited and how they assessed their waiting time. The study concludes the first part of this dissertation in which we addressed the theory and practice of waiting time. The second part discusses the experimental studies and starts with an introduction. In the chapters that follow the various studies will be discussed per subject (colour and light, music, and advertising and infotainment). This dissertation will end with conclusions, a discussion and recommendations for both further research and Netherlands Railways.

CHAPTER 5

WAITING EXPERIENCE AT DUTCH STATIONS[1]

‘NEITHER A WISE NOR A BRAVE MAN
LIES DOWN ON THE TRACKS OF HISTORY
TO WAIT FOR THE TRAIN OF THE FUTURE
TO RUN OVER HIM.’
DWIGHT D. EISENHOWER, 1890-1969

1 This study has been submitted for publication in *Transport Policy*.

D

5.1 INTRODUCTION

Travelling costs time, money and effort. People are thereby inclined to opt for the line of least resistance, i.e. with as little exertion as possible, as cheaply as possible and with as little delay as possible. Time, money and effort are the three budgets on which passengers must draw in order to realize movement between one place and another (Dijst, 1995). In today's affluent society, money and physical exertion are less and less of a restriction for consumers. We are, however, under increasing mental pressure and for many of us time is scarce. As a result of this, not money but time is becoming increasingly important when choices have to be made (Ackerman & Gross, 2003; Gourville, 2006; Grotenhuis, Wiegmans & Rietveld, 2007; Jensen, 1999; Kotler & Stonich, 1991; Pine & Gilmore, 1999).

Research and investments in the railway sector have long been aimed at shortening the train journey, particularly with the optimization of the *objective* waiting and travelling time (Mackie, Fowkes, Wardman, Whelan & Bateson, 2001; Peek & Van Hagen, 2002; Wardman, 2004). The timetable is fixed to the exact minute and the resulting calculations give insight into the extra number of passengers that can be expected as a result of shortening the journey (Huisman, Kroon, Lentink & Vromans, 2005). These efforts are geared to minimize the wait at the station and thus to accommodate the time shortage of passengers. Less attention is paid to the passengers waiting at the station and how they experience this wait, i.e. the *subjective* waiting and travelling time. How long passengers are actually at a station, as compared with how long they *think* they have been there, how they feel there and the value they attach to the wait is still unclear. Yet it is this subjective (waiting) time perception that often appears to be a good predictor of consumer satisfaction, as is also the strong influence of the waiting environment (Pruyn & Smidts, 1998; Taylor, 1994).

By specifically tailoring the waiting environment, Netherlands Railways (NS) can possibly make the journey more pleasant. A more pleasant journey will create more satisfied and loyal customers and can generate more trips. This chapter aims to contribute more insight into the perception and evaluation of waiting time at NS stations. We carried out an explorative study at four Dutch train stations to investigate how long travellers stayed at the station and how long they thought that they stayed there. We also asked them how they evaluated the service and environment of the station. Before explaining the methodology and procedure of this study, we will first have a look at some presumptions based on the literature on waiting.

5.2 HYPOTHESES

5.2.1 OVERESTIMATION OF THE WAIT

In a station environment, it is of primary importance for passengers to get the train on time. In this specific service environment, travellers will be time-oriented because they are primarily focused on getting on the right train at the right time. Usually, a short wait for the train is unavoidable, and passengers' perception of time is prospective. Under these conditions, they are predominantly time-oriented and this leads to our formulating the following hypothesis:

***H1:** Passengers who are waiting at the railway station and on the platform will overestimate their wait.*

5.2.2 ACTIVE OR IDLE TIME

However, passengers are also likely to engage in entertainment and distractions while waiting. Eating or drinking, reading a newspaper, talking to other people or making a telephone call are all specific activities in which attention may be drawn away from the time passing (Maister, 1985; Pruyn & Smidts, 1998). Travellers engaging in such activities may become so fully absorbed in them that they even forget the time, also known as the '*time flies when you are having fun*' phenomenon (Csikszentmhalyi, 1999; Zakay & Hornik, 1991). Therefore we propose:

***H2:** When passengers have something to do during the wait, their attention is distracted from the time and they will be less inclined to overestimate the waiting time than those who do not engage in any activity.*

5.2.3 SHORT AND LONG WAITS

In the transport sector only a few studies are known to have been carried out on the perception of the wait in public transport (bus, tram) and at airports (Baaijens, Bruinsma, Nijkamp, Peeters, Peters & Rietveld, 1997; Hess, Brown, & Shuop, 2004; Moreau, 1992; Need & Nieuwenhuis, 2003; Pruyn, Smidts & Van Dijke, 1999; Taylor, 1994). Moreau (1992) found that people who are waiting for a bus or tram tend to overestimate their waiting time. It turned out, however, that the shorter people had to wait, the greater the overestimation. With longer waiting times, sometimes up to 15 minutes, passengers even appeared to slightly underestimate the waiting time. These results were also found in research focused on time estimations, an effect known as *Vierordt's law,* which states that short waits are overestimated and long waits are underestimated (Boring, 1942; Brown, 1995; Lejeune & Wearden, 2009; Woodrow, 1951). This effect may be understood in terms of a tendency for perceptual judgments to regress from extreme values to the midpoint of the stimulus range (Bobko, Schiffman, Castino, & Chiappetta, 1977; Helson, 1964). In the case of waiting for public transport it may be argued that passengers, who have just arrived at the station are idly waiting for the bus or train to arrive and are more focused on the time passing, hence overestimate their waiting time. Passengers who have been waiting for a long time might lose their focus on time for at least a short period. They might have started to look for some distraction or engage in activities, like reading or talking, whereby they did not keep track of the passing time and thus underestimate their waiting time. We therefore expect that:

***H3:** The shorter the objective wait, the more the duration is overestimated.*

5.2.4 DELAYS AND NEGATIVE EMOTIONS

Railways are service providers and passengers' appraisals are largely determined by the actual, moment-to-moment experiences. A service that runs smoothly is indispensable for keeping customers happy. Almost intrinsic to this is nevertheless the occurrence of 'service failures' (Zeithaml, Bitner & Gremler, 2006). Within the context of railway stations, delays occur when such failures arise and travellers are often concerned that their train will not be running on time. Delayed travellers are prone to negative emotions and will ultimately be dissatisfied with the service provider (Baker & Cameron, 1996; Hui & Tse, 1996; Groth & Gilliland, 2006; Hui, Tse & Zhou, 2006; Taylor, 1994). Baker and Cameron (1996) proposed that people who experience more arousal during the wait will also overestimate the waiting time more strongly. Taylor (1994) studied travellers who experienced a delay at airports and found that they evaluated the service more negatively, especially when they were in a hurry (Taylor, 1994). Negative emotions have been found to negatively affect time perceptions (Hornik, 1992; Tipples, 2008). Passengers who experience a delay, experience more negative emotions. We therefore propose:

***H4:** Delayed passengers will experience more negative emotions than non-delayed passengers. Moreover, delayed passengers will overestimate the (duration of the) wait more than non-delayed passengers.*

5.3 METHOD

In order to find out how much time passengers spend at the station and how they experience their time and stay there, a combined research was carried out whereby observations were linked to a structured questionnaire. Fifty research assistants (students) from the University of Twente paired up and inconspicuously followed every tenth passenger from the moment he/she entered the station to the moment he/she got on the train. Subsequently, questionnaires on the perception of both station and time were handed out in the train to those passengers who were followed and observed, as well as to a number of other passengers who were not but who boarded the same train. The choice for this rather roundabout and time-consuming method was made because it is almost impossible for passengers to give a correct assessment of the duration and emotions at the station and on the platform retrospectively (Pruyn & Smidts, 1999). Moreover, if the respondents had been asked to fill in the questionnaire on the platform, this would have directly influenced the results (and the assessment of the service), i.e. time on the platform would thus have been filled, whereas on the train passengers had more time to fill in a questionnaire anyway. The students followed and interviewed passengers at and from four medium-sized train stations in the Netherlands (Enschede, Deventer, Zwolle and Amersfoort). These stations were specifically chosen because both the numbers of people getting on and off the train and their location were similar.

5.4 PROCEDURE

The research assistants divided themselves into pairs among the four stations according to a pre-arranged plan. One of the two assistants recorded the observed behaviour of the respondent using an MP3 player which recorded the time in seconds. The moment the observed respondents got on the train, they were asked by the second assistant whether they would be willing to participate in a study on the perception of railway stations. The second assistant then supervised the respondent whilst he/she filled out the questionnaire. As the train left the station, the first assistant stopped the MP3 player and randomly distributed the same questionnaire among passengers who had not been followed but who boarded the train at the same station. The questionnaires were collected as soon as the respondents had filled them in. On the return journey both assistants filled in a registration form with the aid of the recordings on the MP3 player. This form is a precise log of the respondents' activities at the station/on the platform and the time they took.

5.5 RESEARCH INSTRUMENT: QUESTIONNAIRE AND REGISTRATION FORM

Both the actual length of time spent at the station and the delays were recorded in a registration form. *Actual length of stay* was measured by clocking the exact length of the time passengers spent at the station and on the platform (from arrival at the station to the departure of the train). *Perceived length of stay* was measured by asking the passengers to indicate in the questionnaire how long they *thought* they had been at the station and on the platform. The questionnaire also measured the evaluation of waiting time, activities performed at the station, the emotions experienced and evaluation of the station.
Evaluation of waiting time was measured with three items. Passengers were first asked how they had experienced their time at the station (*1 = went very quickly,*

5 = went very slowly). Subsequently they were asked to what degree they had spent their time in a useful and pleasant manner (*1 = not at all, 5 = perfectly well).*
Passengers were asked also to indicate which *activities* they had performed at the platform (reading, talking, eating/drinking, looking round).
Station evaluation was measured by asking passengers to give an overall score (from 1 to 10; the higher the score, the more positive the overall evaluation) for the station. They also had to indicate how irritated (*1 = not at all, 5 = quite severely)* they had felt at this station.
Passengers were also asked how they felt on the *platform*. With previous research conducted by Netherlands Railways among 1509 railway travellers (Van Hagen, 2007) having deduced the most relevant emotions or feelings for railway travellers, five emotions were selected: disconcerted, distressed, irritated, alert and observant. In the present study, passengers could indicate to what extent they felt these emotions during their stay on the platform (*1 = not at all, 5 = extremely).* Finally, they were asked whether their train was delayed or not.

5.6 RESULTS

A total of 181 subjects were randomly selected for observation. Of these, 130 agreed to participate in the study by filling in the questionnaire (28% non-response). Another 758 (non-observed) passengers also cooperated by filling in the questionnaire. The non-response among non-observed passengers was in line with previous studies of Netherlands Railways (59%). Of the total of 888 respondents, 47% were male and 53% female. Their average age was 32 years (*SD* = 16.49), with ages varying from 13 to 84 years.

5.6.1 DURATION OF THE WAIT AT THE STATION AND ON THE PLATFORM

It appeared that passengers spent on average 7 minutes and 7 seconds at a station (*N* = 129, *SD* = 07:24). On the actual platform passengers spent on average 4 minutes and 56 seconds (*N* = 120, *SD* = 06:11). This means that at these stations passengers took on average just over 2 minutes between entering the station and arriving on the platform and hence spent 62% of the total duration of time at the station actually on the platform. No differences were observed between the four stations in this study.

5.6.2 PERCEPTION OF WAITING TIME

A comparison of the actual lengths of waiting observed (objective waiting time – OWT) and those perceived by the passengers (subjective waiting time – SWT) indicated that passengers overestimated the wait on average by 01:36 (*SD* = 06:08). Proportionally this is an average of 23%, whereby more passengers overestimate (60%) than underestimate the wait (40%).
The results convincingly support our proposition (H1): *Waiting times at the station and on the platform are overestimated*.

5.6.3 TIME PERCEPTION AND PERFORMED ACTIVITIES

When we look at the differences between people who were actively doing something (reading, talking, eating/drinking, looking around) and those who were not, then it appears that the passive people significantly overestimated the time spent at the station (3 minutes and 3 seconds as opposed to 31 seconds for active people), ($F(1, 102) = 4.82$, $p = .03$: Table 5.1). Our proposition (H2) that when *passengers are busy on the platform, they will be less inclined to overestimate the waiting time than passengers who do not engage in any activity,* was supported by these findings.

Table 5.1 Mean difference in actual time and perceived time

	Performed activities	No performed activities
	(N = 53) *M (SD)*	*(N = 51)* *M (SD)*
Perceived time – Clock time	0:00:31 (0:06:20)	0:03:03* (0:05:20)

Note: * *p < .05*

5.6.4 DELAY

Passengers who were delayed found that the time passed more slowly in comparison with those who experienced none ($F(1,782) = 64.32$, $p < .001$). This supports our proposition (H4): *Delayed passengers will overestimate the (duration of the) wait more than non-delayed passengers.*

A multivariate analysis of variance (MANOVA) revealed that the 5 emotions (disconcerted, distressed, irritated, alert and observant) were affected by the occurrence of a delay ($F(5, 660) = 12.61$, $p < .001$). People *with* a delay scored significantly higher on all of these emotions (Table 5.2). Moreover, those who had been delayed also awarded a significantly lower score for their evaluation of the station ($F(1,772) = 7.63$, $p < .01$) (Table 5.2). This means that when a service failure such as a delay occurs, this will reflect on the evaluation of the station. The findings supported the first part of our proposition (H4): *Delayed passengers will experience more negative emotions*.

Table 5.2 Average score (10-point scale) and (SD) for the station and the accompanying emotions (5-point scales) of people who did/did not experience a delay with the train

	No delay	Delay
	M (SD)	*M (SD)*
Disconcerted	1.2 (.57)	1.4 (.82)**
Distressed	1.3 (.72)	1.4 (.85)*
Irritated	1.3 (.67)	1.9 (1.15)***
Alert	2.2 (1.09)	2.5 (1.14)**
Observant	2.4 (1.12)	2.6 (1.13)*
Score station (1-10)	7.1 (.84)	6.9 (.81)**

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

5.6.5 SHORT AND LONG WAITS

When focusing on differences between OWT and SWT on the platform (Paragraph 5.6.2), a few passengers who waited a relatively long time appeared to influence the average waiting time more strongly than the majority of passengers who waited only briefly. In order to check whether this causes a bias in the interpretation, we also determined a Time Sense Factor (TSF) per individual. This TSF[2] shows the difference in a ratio SWT/OWT and appears to be 1.90 at the station and 1.95 on the platform, which means that on average passengers overestimate their time spent at the station and the platform by almost 100%. We also tested to what extent the length of stay (at the station and on the platform) affected the over- or underestimation of the time. The waiting period was thus divided into four time blocks (Table 5.3). Based on studies by Hui and Tse (1996) and Moreau (1992), we decided to distinguish between 4 time blocks: shorter than 5 minutes, 5-10 minutes, 10-15 minutes and longer than 15 minutes.

Table 5.3 shows that passengers with a short wait – less than 5 minutes – overestimate the duration at the ***station*** more (factor 2.6). The longer one has to wait, the closer the estimation is of the actual waiting time. Passengers who waited between 5 and 10 minutes still slightly overestimated the waiting time (1.35), passengers who waited between 10 and 15 minutes appear to be the best appraisers of time (with a TSF of 1.05). Finally, passengers who waited longer than 15 minutes underestimated their wait at the station by one quarter (factor 0.75). The results are in line with *Vierordt's law* (Boring, 1942; Brown, 1995; Lejeune & Wearden, 2009; Woodrow, 1951), which states that shorter time intervals are overrestimated and longer time intervals are underestimated (Paragraph 5.2.3). The ***platform*** is *the* spot where passengers spend most of their waiting time. If we determine the TSF on the platform, then it appears that time there is also overestimated despite the fact that passengers seem to have a clearer notion of time. People who spent less than 5 minutes on the platform overestimated the wait with a factor 2.4. Under longer waiting conditions the factor eventually decreases to 1. Interestingly, there appears to be no underestimation of time spent on the platform, not even under the longest waiting conditions (>15 minutes).

These results support our proposition (H3): *The shorter the objective wait, the more the duration is overestimated.*

2 TSF: Time Sense Factor = the subjective waiting time divided by the objective waiting time per experimental subject.

Table 5.3 Means Time Sense Factor of wait on platform and at station

STATION	< 5 min	5-10 min	10-15 min	> 15 min	*Total*
N	55	29	9	13	106
Minimum	0.00	0.12	0.44	0.32	
Maximum	10.00	3.43	2.08	1.15	
M	**2.60**	**1.35**	**1.05**	**0.75**	**1.9**
SD	2.22	0.92	0.63	0.26	1.85
PLATFORM	**< 5 min**	**5-10 min**	**10-15 min**	**> 15 min**	*Total*
N	63	22	7	7	99
Minimum	0.0	0.0	0.44	0.33	
Maximum	17.14	2.88	1.79	1.81	
M	**2.40**	**1.22**	**1.08**	**1.00**	**1.95**
SD	3.66	0.71	0.44	0.50	3.0

Note: *Time Sense Factor = the subjective waiting time divided by the objective waiting time per experimental subject.*

5.6.6 TIME AND STATION EXPERIENCE

On scrutinizing the link between the duration of the wait and the evaluation of the station, it appears that the longer the subjective waiting time, the more irritated the respondents were. This significant relationship applies to both the estimated time on the platform and the estimated time at the station ($F(3,699) = 11.24$, $p < .001$ and $F(3,696) = 10.04$, $p < .001$ respectively). On the other hand, the shorter passengers thought they had to wait, the more useful they thought their time was spent ($F(3,782) = 7.05$, $p < .001$). These results are irrespective of the fact that one might or might not have experienced a delay. In itself this has a logical bearing. People who have had to wait longer are more annoyed than those whose wait was short (Table 5.4).

Table 5.4 Menas irritation, entertainment on platform and at station versus length of time

	< 5 minutes	5–10 minutes	10–15 minutes	> 15 minutes	Total
Irritation platform	1.30[a]	1.52[b]	1.55[b]	1.88[c]	**1.44**
Irritation station	1.30[a]	1.34[a]	1.57[b]	1.76[b]	**1.46**
Time pleasantly spent	4.70	4.69	4.65	4.55	**4.66**
Time usefully spent	3.69[a]	3.41[b]	3.04[c]	3.16[bc]	**3.38**

Note: *Means with various superscripts (a, b and c) differ significantly in the row. Scale: 1 = not at all, 5 = extremely.*

5.7 CONCLUSION AND RECOMMENDATIONS

In the present study we observed that passengers appear to overestimate the waiting time at stations. The shorter the wait, the greater the overestimation of the waiting time. Passengers who spend 15 minutes or longer on a platform have a clearer notion of the actual time spent there. When they spend 15 minutes or longer at the station, they underestimate the time.

Passengers particularly overestimate the waiting time when they have nothing to do and when they are delayed. The perception of both subjective time and the station are significantly linked to the feeling that one has spent the time usefully or pleasantly. This confirms the findings by Hornik (1992; 1993) who states that customers who experience more pleasure will experience a shorter wait compared with customers who experience an unpleasant stay. The experienced time pressure plays an important role in the arousal and emotions felt, particularly with delays. The results confirm the findings of Baker and Cameron (1996), namely that people who experience more arousal will overestimate waiting time more and the findings of Zakay (1989), that people who pay more attention to the passage of time will overestimate the wait more.

Passengers' subjective perception of time differs from the actual length of the stay. As a rule, the length of the wait is overestimated. Despite the fact that passengers at stations are so focused on time – aware as they are of the exact departure time of their train – there is a considerable discrepancy between clock time and experienced time. When passengers have a long wait at a station, they tend to underestimate the time. One explanation might be that people who have to wait longer at a station will undertake activities and forget the time, hence the underestimation. This is supported by the fact that when travellers wait less than 5 minutes or more than ten minutes they award the overall station a higher score, than when their wait was between 5 and 10 minutes. A long wait is experienced as acceptable as a short wait; travellers have time to undertake other activities, like shopping. On the platform there is no question of underestimating the time. The explanation for this might be that people on a platform do not undertake many activities but stand or sit idly waiting for the train to arrive. Meanwhile they keep a close eye on the time and the longer they have to wait, the more precisely they know just how long they have been waiting. Moreover, the platform offers fewer distractions and fewer possibilities to fill the time than elsewhere at the station.

Our findings concur with those of previous research which shows that shorter waiting times are overestimated more than longer ones (Hirsch, 1956; Lejeune & Wearden, 2009; Moreau, 1992). Passengers who are delayed experience significantly more arousal and negative emotions (irritation, disconcertion and distress). It is also clear that people who undertake activities overestimate the time less, are less aroused and have more positive emotions than those who do not. They also feel that they have spent their time at the station more usefully. Apparently, people are able to fill their ‘spare’ time with activities which help them to temporarily forget the time and feel better because of it.

All in all, this study has confirmed that time is of the essence to train passengers. The question is whether passengers actually experience this time as ‘waiting time’ or that waiting at a station/on a platform is a luxury that only few passengers can afford. Time at a station, in fact, is primarily and purposefully devoted to catching the train on time and train operators should do all they can to facilitate this. Irritation and stress are luring and will influence the perception of time (Van Hagen, Galetzka & Pruyn, 2007).

Passengers attach considerable importance to time. For those in a hurry to catch their train on time, time will pass too quickly. For others with more time, if not spent in a pleasant or useful way, this will be regarded as lost time.

Given the fact that people will always have to wait, it is advisable to particularly invest in making the platforms more pleasant; *the* spot where passengers spend on average more than 60% of their time and where the chance of overestimating the time is highest. Moreover, the evaluation of the platforms is significantly lower than for the rest of the station. Passengers attach importance to a pleasant waiting environment. It is thus not only advisable to keep waiting times to a minimum but also to enhance the attractiveness of the waiting environment, such as with the purposeful deployment of atmospheric elements. A pleasant environment is conducive to passengers’ forgetting the time and passing a more positive judgement on their time spent there (Baker & Cameron, 1996; Pruyn & Smidts, 1998; 1999; Turley & Milliman, 2000). Making the waiting environment more pleasant can be achieved by stimulating the senses in such a way that passengers experience a maximum level of comfort. Possibilities are to offer sufficient shelters and seating, pleasant background music, to use congenial and calming colours or to offer sufficient distraction, such as a beautiful view, something to read or television screens offering infotainment. Further research will have to establish the degree to which atmospheric elements can contribute to a more pleasant waiting environment in a railway station. The effects of such measures on platforms will be addressed in the following chapters.

PART II

INFLUENCING THE ENVIRONMENT

‘HOW WAITING TIME IS EXPERIENCED
DEPENDS PREDOMINANTLY ON
UNCONSCIOUS PROCESSES THAT
CAN BE PRIMED BY RELATIVELY
CHEAP INTERVENTIONS.’

AD PRUYN, 2010

INTRODUCTION TO THE EXPERIMENTAL STUDIES

‘IT APPEARS THAT THE RELATIONSHIP BETWEEN TIME SPENT IN THE RETAIL ENVIRONMENT AND ATMOSPHERIC VARIABLES IS BOTH COMPLEX AND NOT UNIVERSAL. IT APPEARS THAT SOME ENVIRONMENTAL STIMULI AFFECT TIME PERCEPTIONS WHILE OTHERS DO NOT.’

TURLEY AND MILLIMAN, 2000

INTRODUCTION

In the previous chapters we discussed the theory of waiting experience and saw what it means in practice to Dutch service providers and to stations in particular. In the following chapters we will find out by means of empirical studies whether the insights found in the literature can also be found in a station environment. A station environment differs from the often studied retail environment in a number of ways. In a station environment, for example, time is of the essence, because the departure of the train is scheduled and passengers do not want to miss it. Hence they are tense, because if they arrive (too) early or their train is delayed, they have to wait. A wait is experienced as lost time and tedious. Waiting for a train differs in a number of ways from waiting in a retail environment. When you are waiting for the train there are no formal (waiting) rules, there is no queue formation and passengers invariably wait in the open air. On the other hand, like in a retail environment, one can distinguish between utilitarian- and hedonic-oriented customers, with also on a platform very busy periods alternating with very quiet ones. Due to the special characteristics of the station environment, emotions and waiting might be experienced differently to what has been reported in the literature.

This PhD thesis will address which stimuli have an effect on emotions and behaviour in the station environment. Subsequently, we will discuss a conceptual model that presupposes that environmental stimuli initiate emotions that together with the waiting experience determine the evaluation of the station. Finally, we will address the research methods used and discuss two moderators, passenger type and density, which we suspect influences the station and waiting experience.

ATMOSPHERICS

The studies investigate the influence on the waiting experience of three environmental variables: coloured light, music and advertising & infotainment. We chose these three environmental variables because they are in keeping with the model of the *servicescape*, as used by Baker (1986, Paragraph 4.3), and because they can be relatively easily manipulated in a real station. This is in line with research stressing that servicescapes are perceived holistically (Mattila & Wirtz, 2001), implicating that environmental factors do not act in isolation but *interact* with customer's needs to create the overall experience of the service setting. The three dimensions distinguished by Baker (1986) are: *ambient, design* and *social*.

Ambient factors are invisible, like temperature, smell, noise, music and light. These factors are often unconsciously or subliminally perceived and are only noticed when they have exceeded an acceptable limit, such as light that is too bright or music that is too loud. The assumption is that influencing *ambient* elements can have positive effects on the emotions of the passengers, the waiting experience and the evaluation of the station environment with regard to density and passenger type. We manipulated the *ambient* environment with music and light. Our choice for music was made not only because some research has already been conducted on its effects in a waiting environment (Oakes, 2000; Oakes & North, 2008; Tai & Fung, 1997; Turley & Milliman, 2000), but also because music in a station environment is relatively easy to realize thanks to the presence of loudspeakers (Baker, Grewal & Parasuraman, 1994; Baker, Levy & Grewal, 1992). Also the light intensity on a platform is easy to manipulate and appears to influence passengers' experience (Biner, Butler, Fischer & Westergren, 1989; Butler & Biner, 1987; Van Bommel, 2003). Hence we studied the influence of light intensity on the waiting experience of passengers.

Design factors concern visible, functional and aesthetical elements, such as architecture, colour, style and interior design. In studies on environmental design, colour, advertising and infotainment were manipulated. Colour can influence the perception of the environment (Berman & Evens, 1989; Brengman & Geuens, 2004; Golden & Zimmerman, 1986). An internally conducted study by NS revealed that passengers regard the platform environment as being grey, bland and boring (SENTA, 2005, Chapter 1), and with modern techniques, such as ambilight, colour can be easily and flexibly introduced to the environment and ameliorate the wait. Advertising and infotainment can be employed as explicit distractors. The presence of advertising and the speed with which the images change are assumed to distract passengers from their eye on the clock and which in turn will also result in their experiencing the waiting time as being shorter and the waiting experience as being more pleasant (Brown, 1995; Dennis, Newman, Michon, Brakus & Wright, 2010).

Social factors concern the *people* in the environment, both personnel and customers, whereby their numbers, type and behaviour infuence the environmental perception (Baker, 1986; Baker & Cameron, 1996; Baker, Grewal & Parasuraman, 1994; Baker, Levy & Grewal, 1992). At rush hour there are many passengers at a station, but in off-peak hours there are often very few (SENTA, 2005). In the studies of this dissertation, density, as a social component of the environment, was manipulated by comparing a busy station environment (many passengers) with a quiet one (few passengers).

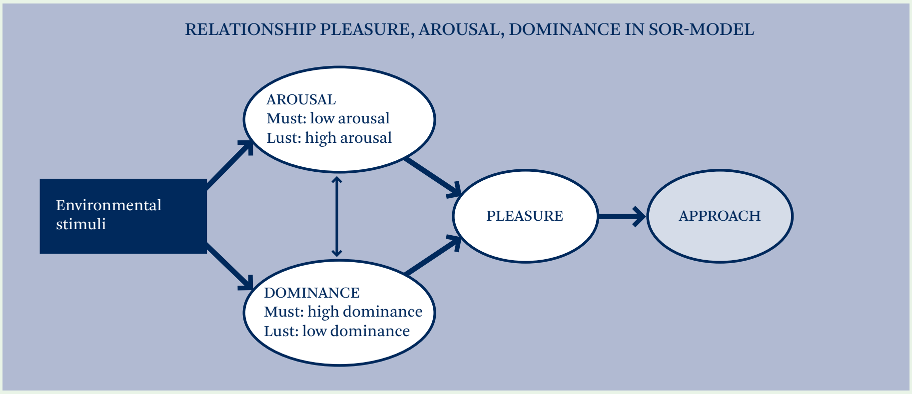
Besides environmental factors also other factors play a role in how the station and the waiting time is experienced, such as personality and motivational orientation. At a station one can distinguish between goal-directed passengers and those in a hurry who wish to catch their train (must passengers), and passengers who have more time on their hands and are in less of a hurry (lust passengers). As we expect this motivational orientation to determine how the environment is experienced, our studies will also compare the experiences between must and lust passengers.

The studies in this doctoral thesis hence tests the theories of time experience and environmental influence by manipulating a number of environmental characteristics. In this way we can ascertain how the process of environmental influence in a station environment actually works with our findings possibly also being applicable to similar environments.

OVERALL DESIGN

According to the SOR model, environmental stimuli influence cognitive and affective processes which in turn determine approach or avoidance behaviour (Massara, Liu & Melara, 2010; Sweeney & Wyber, 2002). As we saw in Chapter 4, the environment influences through its degree of arousal the *hedonic tone*, the sense of *control* and the *waiting experience*. Together these three factors determine approach or avoidance behaviour. In the studies the *hedonic tone* is measured with pleasure, and the sense of *control* is measured with dominance. The *waiting experience* is measured with the time perception, the experience of the duration and the acceptance of the wait. Together this ultimately results in a station evaluation measured with a platform or station score and a waiting time evaluation measured with a pleasant (hedonic) and useful (utilitarian) waiting experience.

In Chapter 4 we saw that, depending on the context, two levels of optimal stimulation can be distinguished that influence the hedonic tone (Apter, 2007; Paragraph 4.14). The combination of the number of environmental stimuli (few or many) with density (quiet or busy) or motivational orientation (must or lust) determines how passengers experience the platform and the wait. This is why our studies distinguish between two different environments: a stimulating versus a calming one. A calm environment is created with few enviromental stimuli, such as cool colours, dimmed lighting, soft music, little distraction and few people on the platform. A stimulating environment, on the other hand, is created with warm colours, a high light intensity, stimulating (up-tempo) music, distraction and many people on the platform. A separate study showed that goal-directed passengers are more concentrated on what they are doing and are less receptive to environmental stimuli (Appendix 4). That is why we expect a stimulating environment to result in a lower hedonic tone for must passengers than for lust passengers. Various authors have ascertained that the degree of congruence of the number of stimuli in relation to the goal-directedness of the consumer or the experienced crowding determines the experienced pleasure (Eroglu, Machleit & Chebat, 2005; Kaltcheva & Weitz, 2006; Massara, Liu & Melara, 2010; Oakes & North, 2008). In psychology, congruence implies that someone's needs, desires and preferences concur with the situation in which one finds oneself. Incongruence between need and situation means that people feel more uncomfortable in that situation (Matilla & Wirtz, 2001; Pruyn & Wilke, 2001; Spokane, Meir & Catalano, 2000). Research has shown that (in)congruence between various aspects of a product design results in a better (or worse) *processing fluency* and thus also in a more positive (or more negative) product evaluation (Van Rompay, Pruyn & Tieke, 2009). According to Masara, Liu and Melara (2010), a high level of pleasure is attained with an optimal level of *activation*. Goal-directed consumers experience more pleasure with little arousal and much dominance (*hypo-activation*) and non-goal-directed consumers experience more pleasure with much arousal and little dominance (*hyper-activation;* Massara, Liu & Melara, 2010). Many environmental stimuli, such as a busy platform, demand a great deal of mental attention and can be experienced as too stimulating, whereas a lack of stimuli, such as on a quiet platform, can be felt to be tedious. Figure 1 visualizes the relationship between arousal with dominance on pleasure (Massara, Liu & Melara, 2010).



Source: after Massara, Liu & Melara, 2010

Figure 1 Relationship PAD emotions in SOR model

By combining the arrangement of Massara, Liu and Melara (2010) with the *states* of Apter's reversal theory (2007), the following four groups can be distinguished:

- Many stimuli + crowded + must: non-congruent → *Anxiety*
- Many stimuli + crowded + lust: congruent → *Excitement*
- Few stimuli + quiet + must: congruent → *Relaxation*
- Few stimuli + quiet + lust: non-congruent → *Boredom*

Figure 2 shows the different states of Massara, Liu and Melara (2010) placed in reversal theory (Apter, 2007).

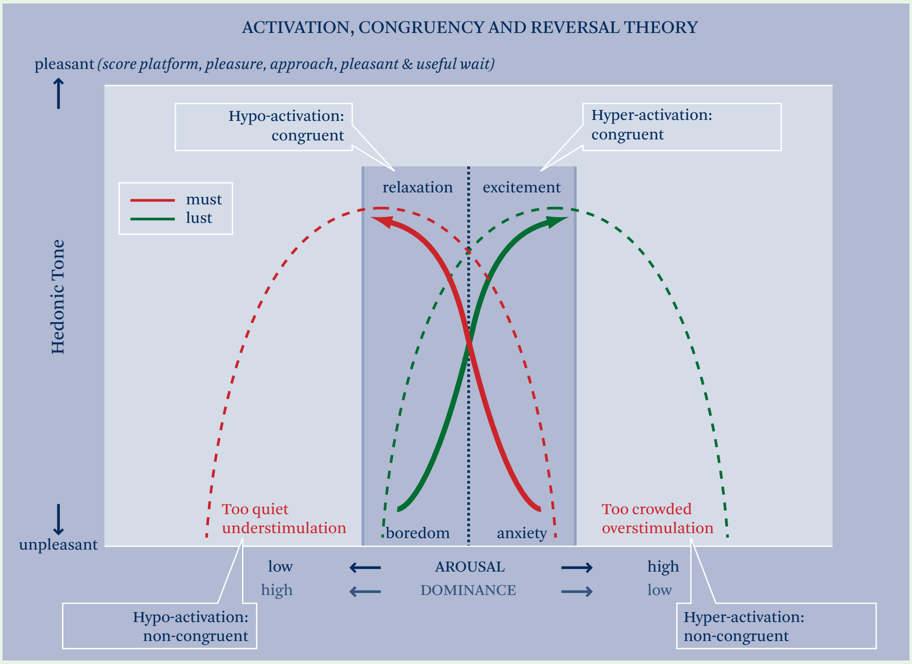


Figure 2 Elements of research design

CONCEPTUAL MODEL FOR THE STUDIES

A station is a complex and goal-directed environment in which passengers have to catch their train on time. For must passengers dominance is important, because they want to be able to orientate themselves quickly, yet also lust passengers want to know where and at what time their train leaves. A preliminary study shows that, in accordance with the conceptual model of Massara, Liu and Melara (2010), must passengers experience greater dominance at a station than lust passengers, and that lust passengers are more receptive to arousal than must passengers (Appendix 4). Although Massara, Liu and Melara (2010) did not include waiting time in their model, it does play an important role in this doctoral thesis, which means that it will have to be added to the conceptual model. Time experience is divisible into a cognitive and an affective experience (Pruyn & Smidts, 1998). The cognitive experience concerns the estimation of the time and the duration experience (short/ long), and the affective time experience represents how people have emotionally experienced an interval. The affective time experience can negatively influence pleasure (in which also arousal plays a role) (Baker & Cameron, 1996). In Chapter 3 we saw that cognitive time perception is determined by processing much or little (complex) information and dividing attention between time- or non-time-bound activities. If much attention is paid to the wait and there are few environmental stimuli, then passengers experience not only less arousal and less pleasure but also find the wait boring (Baker & Cameron, 1996). When people are in a hurry, are alert and have to wait, they experience much arousal and little pleasure, with stress as a result. In Chapter 4 we saw that the affective waiting experience is influenced by arousal and pleasure (Baker & Cameron, 1996; Droit-Volet & Meck, 2007; Zakay & Block, 1997), and that it influences the evaluation of the wait and the service (Davis & Heineke, 1998; Davis & Vollmann, 1990; Harell & Hutt, 1976; Hornik, 1984; 1992; 1993; Machleit & Eroglu, 2000; Nie, 2000; Unzicker, 1999). Waiting experience can thus be influenced by arousal and pleasure, but so too can waiting experience influence arousal and pleasure (dotted arrows in Figure 3). Ultimately, the waiting experience influences the evaluation of the wait, such as the utilitarian or hedonic waiting time attitude (Kaltcheva & Weitz, 2006). If we enlarge Figure 1 to include the waiting experience, and assuming that dominance is important to all passengers, then the conceptual model of Figure 3 arises. In the following chapters, this conceptual model will be our starting point for the various studies.

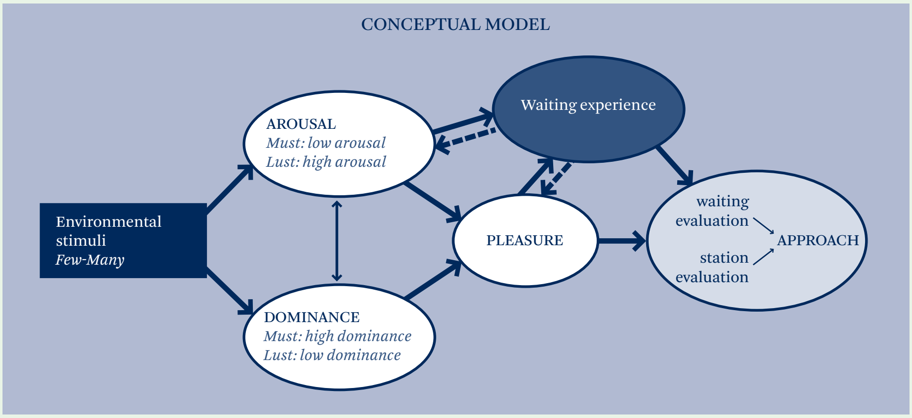


Figure 3 Conceptual model for the various studies

STUDIES

As this doctoral thesis aims to put its scientific findings into practice, each chapter will commence with a field study in order to ascertain whether environmental manipulation has the desired effect when put into practice. If it appears that they actually do work in practice, then in a conditioned virtual environment follow-up studies will be conducted on how various environmental characteristics are experienced in different situations. The field and virtual studies combined should answer the question how the *ambient, design* and *social* dimensions (Baker, 1986) must be employed to create a positive station and waiting experience.

VIRTUAL WORLD

The environmental manipulations, such as music, infotainment, colour and light can be studied best by changing the environment in an existing station. The disadvantage of a field study is that all kinds of interference, whether that be e.g. bad weather or a delayed train, can influence the results. Adapting manipulations in an existing station, moreover, costs a lot of time and money (Hui & Bateson, 1992). An alternative method is thus to use a controlled environment which precludes disruptive influences (Kardes, 1996). There are various possibilities: paper scenarios, a mock-up of a station, audio or visual simulations, such as photos or videos of a station (Bitner, 1990; Eroglu & Machleit, 1990; Hui & Bateson, 1991; 1992; Surprenant & Solomon, 1987). The choice was made for a virtual station because it affords easy manipulation of the environment, like density or adding different kinds of music, infotainment, colours and intensity of light. Manipulating the environment is easy and is relatively cheap and testing in a virtual station allows manipulation of the objective waiting time per respondent and to record this more easily and accurately. Moreover, the respondent can find his/her way through the station at his/her own pace. This is imperative for a complex environment such as a station (Bitner, 1992), because the sense of control can thus be copied as realistically as possible (Averill, 1973). Finally, before entering the virtual world, experimental subjects can be asked to imagine themselves in a specific scenario. The ecological validity of the use of virtual environments has already been shown (Blascovich, Loomis, Beall, Swinth, Hoyt & Bailenson, 2002; Kardes, 1996; Massara, Liu & Melara, 2010; Riva, Mantovani, Capideville, Preziosa, Morganti, Villani, Gaggioli, Botella, Alcañiz, 2006). The advantage of a virtual environment is that it also meets the recommendation of Hui and Bateson (1992) to imitate ambient sounds that strengthen the ecological validity. In sum, the findings in a replicated environment are comparable with an actual environment.
As previously sketched, the studies aim to discover the effects of a calming and a stimulating environment on the station and waiting experience. In the colour study, for example, we compare cool colours with warm ones (Kaltcheva & Weitz, 2006), in the music study we compare calming with stimulating music (Bruner, 1990; Sweeney & Wyber, 2002), and in the infotainment study we compare slow- and fast-changing images (Brown, 1995; Dennis, Newman, Michon, Brakus & Wright, 2010).

PROCEDURE VIRTUAL WORLD STUDIES

Leiden Central Station was used for both the field and the virtual studies. For the virtual studies a replica was made of Leiden Central, where from behind a computer experimental subjects could move with the mouse in the form of an avatar through the station. Apart from the manipulation (e.g. colour, light or infotainment), the procedure was identical in each study. Members of the NS panel (Appendix 1) were invited by email to participate in the virtual research with as an incentive the chance of winning a book token. In the email was a link with which experimental subjects could download the virtual world. Before entering it, they received an explanation on how to navigate and were given one of two assignments (must/lust scenario, see below). Experimental subjects started the virtual world on the forecourt of Leiden Central Station and were asked to take the train to Amsterdam. The virtual station had a 10-minute cycle (running from 17:52-18:02 hrs), after which the train departed. Experimental subjects entered this cycle at an arbitrary moment (depending on their self-chosen inlog moment) and thus had a different objective waiting time. They were free to navigate with their mouse through the entire station and with the aid of departure boards, clocks and/or announcement messages could find the correct train in time. Once the experimental subjects had ascertained where their train would depart from, they navigated to the correct platform and waited for the train. When it arrived, they clicked on the train and were subsequently led to a questionnaire. After answering it, the experimental subjects were thanked for their cooperation and the window closed. Whilst the experimental subjects navigated through the station, their objective waiting time at both the station (from the entrance to clicking on the train) and on the platform (from their first step on it to the time they clicked on the train) was recorded to within a second.

DENSITY

As suggested, customers at a railway station entertain well-defined goals. Most importantly, customers have to get on the right train at the right time. To this end, they need freedom of movement and visual control over the environment (i.e. seeing where to go). In addition, they have to stay alert and attuned to messages informing customers on departures, platform changes or other unexpected events. Under such circumstances, high density may be considered a hindrance to goal achievement (insofar as it restricts both free movement and visual control over the environment, as well as interfering with any efficient and audible communication of service messages via the loudspeakers); perceived control is hence negatively affected. On the other hand, when density is low, e.g. at off-peak hours, and arriving on time or finding one's way through the crowd is no longer an issue, customers are likely to value entertainment or distraction. Under such circumstances, perceived control sooner relates to the fulfilment of customers' need for entertainment and distraction (i.e. experiential goals) in an attractive environment. Lacking direct means to control density, service managers face the question of how to mitigate such negative effects of an overcrowded (or undercrowded) environment. As argued, we propose that service managers may alleviate negative effects of a particular, uncontrollable factor through informed use (or absence of use) of other, more controllable, environmental influences.

In the virtual world, density was manipulated by placing either few or many other 'passengers' on the platform, just as peak and off-peak hours were distinguished in the real world. To give the impression of a realistic situation, a number of avatars were waiting on the platform and although they were standing still, they did move, e.g. with their arms or head. On a quiet platform there were several other passengers present, whereas on a busy platform there were dozens (Figure 4).

Figure 4 Manipulation density in the virtual world

A manipulation check on density was conducted in each study in order to ensure that the quiet platform was indeed perceived as quiet and the busy platform was perceived as busy. To this end we used the Perceived Crowding Scale of Harrell, Hutt and Anderson (1980), which, as its name suggests, measures the degree to which people perceive an environment as busy.

GOAL-ORIENTEDNESS

Also the motivational orientation is important in a station environment (e.g. Paragraphs 1.5 and 4.12). A differentiation can be made between the utilitarian and hedonic orientation of consumers and these particularly differ from one another in their degree of goal-orientedness (Batra & Ahtolla, 1991; Kaltcheiva & Weitz, 2006). Commuters are utilitarian or *must* consumers who regularly travel by train and whose movements are goal-directed. Recreational or *lust* passengers, on the other hand, see their train journey as part of the leisure activity; they are more hedonic and less goal-directed (SENTA, 2005). The assumption is that goal-directed passengers are more involved in the travel process, and thus also occupied with the time, than those who are not goal-directed. Before our experimental subjects entered the virtual world, they were given an assignment that also incorporated the difference between goal- and non-goal-directed passengers. The experimental subjects were informed that they were already in possession of a valid railway ticket. For the goal-directed passengers the text read: *"It is Wednesday evening and you have just arrived on the station forecourt. Tonight you have an appointment in Amsterdam that is really important for you, so it is imperative that you arrive on time. You must get the first train to Amsterdam if you want to be there on time. You are in quite a hurry* *and it would be really inconvenient if the train is delayed."* The text for the non-goal-directed passenger was: *"It is Wednesday evening and you have just arrived on the station forecourt. With nothing planned tonight, you have decided to go to a museum in Amsterdam. As you will be going to the museum on your own, it does not matter when you get there, so you can take your time."*

In order to ensure that the scenario belonging to either the must or lust condition was actually perceived as such by the respondents, a pre-test was carried out. Twenty respondents were given one of two scenarios, following which they had to fill in a short questionnaire comprising four items from the Motivational Orientation Scale of Kaltcheva and Weitz (2006, Alpha Coefficient 0.79). A t-test was conducted to compare the scores for motivational orientation. Must passengers ($M = 4.8$, $SD = 1.32$) scored significantly higher for motivational orientation than lust passengers ($M = 2.87$, $SD = 1.19$), $t(18) = 3.42$, $p < .01$. We could thus deduce that the scenarios were suitable and would lead to the desired effects.

CHAPTER 6

COLOUR AND LIGHT

'MERE COLOUR, UNSPOILED BY MEANING, AND UNALLIED WITH DEFINITE FORM, CAN SPEAK TO THE SOUL IN A THOUSAND DIFFERENT WAYS.'

OSCAR WILDE, 1854-1900


DIPJE?

6.1 INTRODUCTION

In Chapter 1 we saw that passengers label stations as grey, bland and boring (SENTA, 2005). Hence this chapter broaches our examining whether adding colour to the platform can result in a more pleasant waiting experience and better station evaluation. As we saw in Chapter 4 that the combination of colour and light is relevant to environmental experience (Valdez & Mehrabian, 1994), we will not only manipulate colour but also the light intensity. The situational circumstances, such as density and passengers' goal-orientedness, will be included as moderators. First we will conduct a field study in order to ascertain whether colour in combination with light intensity has any influence at all on passengers' affective appreciation. Then in two virtual studies we will investigate what influence the warmth of the colour has on the station evaluation and the waiting experience. The first virtual study will be conducted in a laboratory and will examine whether a colour's warmth influences the affective appreciation and experience of the wait. The second virtual study will be conducted online whereby we will examine whether colour in combination with light intensity, passengers' goal-orientedness and density influences the station evaluation and the waiting experience. First, however, we will discuss the relevant literature on colour and light.

6.1.1 LITERATURE OVERVIEW OF COLOUR AND LIGHT

Many studies on influencing the environment focus on the effects of temperature, smell, sound and decor. Changing these factors can influence both perceptual and emotional reactions as well as actual behaviour (Kotler, 1973). Colours also strongly determine how we feel. In public spaces, such as stations, we are surrounded by them. By giving stations certain colours, NS can exert influence on the emotions that customers experience. Colours with a short wavelength are specified as cool colours (blue and green), whereas those with a long wavelength are warm (red and yellow). Light comprises the light intensity and the diffusion or spreading of the colour tone. Bright or dimmed light is determined by the light intensity. Little research has been conducted on the combination of colour and light (Brengman & Geuens, 2004; Valdez & Mehrabian, 1994). The majority of (published) studies on the effects of colour in the retail environment was conducted in a laboratory setting. To our knowledge, no research has yet been published on the usage of light and colour in a railway station.

6.1.2 COLOUR

In public environments there is often a need for the right colour that incorporates the element 'pleasantness'. All colours that are perceived as such will generally result in positive emotions. Although the optimal design may strongly differ across service contexts and situations (and even across individual customers), it appears that specific colours, generally perceived as pleasant, may result in very specific emotions. Cool colours, such as blue and green, have a relaxing effect, whereas colours with a long wavelength, such as orange and red, are stimulating (Adams & Osgood, 1973; Jacobs & Suess, 1975; Valdez & Mehrabian, 1994, Walters, Apter & Svebak, 1982; Wexner, 1954). Warm colours are perceived as being protective (Wilson, 1966). Clear and saturated colours are experienced as more pleasant (Guilford & Smith, 1959), but are also more strongly associated with fear than cool colours (Jacobs & Suess, 1975). Dark colours are perceived to be more dominant and more strongly provoke hostility and aggression. So, with the environment and state of mind determining the effects of colour, red in the cinema foyer will exude a warm, festive aura whereas the same colour in a hospital can have a negative influence on the state of mind of the already anxious visitor.

Research on the use of colour in retail environments has shown that it influences buying behaviour (Belizzi & Hite, 1992), purchasing speed (Belizzi & Hite, 1992), time spent in the shop (Belizzi & Hite, 1992), pleasure (Belizzi & Hite, 1992; Crowley, 1993), arousal (Crowley, 1993), image of shop and merchandise (Belizzi, Crowley and Hasty, 1983; Crowley 1993), and the potential to draw customers into the shop (Belizzi, Crowley and Hasty, 1983). Blue and green are perceived to be the most pleasant in a retail environment (Eysenck, 1941; Jacobs & Suess, 1975) and are also evaluated more positively than shops with a warm (orange) interior (Babin, Hardesty & Suter, 2003; Crowley, 1993). The results for pleasure strongly resemble the results for arousal. From research by Kwallek et al. (1988; in Stone & English, 1998), it appeared that people who performed a business task in red surroundings later scored higher for stress and anxiety. Colours with a short wavelength cause a person to be more externally oriented and to show forceful and extrovert behaviour.
From the study by Belizzi, Crowley and Hasty (1983), it appeared that respondents, irrespective of their colour preference, felt more physically drawn to warm colours yet perceived surroundings in warm colours as less pleasant. Warm colours are apparently successful when it comes to drawing people in (entrance, shop window), but less so when it comes to making them feel at ease. In situations where people experience mental pressure, it is better to keep the colours cool; with their calming effect, people are prepared to remain longer in such surroundings. Brengman (Brengman, 2002; Brengman & Geuens, 2004) showed respondents photos of a shop in which the colours were manipulated. She concluded that people will spend more time and money in a shop if they find the colours agreeable (Brengman, 2002; Brengman & Geuens, 2004). Blue and yellowish red are perceived as pleasant, as are light colours. Such atmospheres invoke approach behaviour and the desire to explore. According to Brengmann (2002), red and yellowish green, just like bright and dark colours, are perceived as less pleasant; these colours lead to tension and stress and evoke a feeling of distaste. Such negative stress leads to avoidance behaviour (Brengman, 2002). Brengman and Geuens (2004) recommended that in future research the results should be tested in a conditioned environment, which is after all different than evaluating photos.

6.1.3 LIGHT

Psychologists state that light has a tremendous influence on human behaviour. Baker and Cameron (1996), Hopkinson, Petherbridge and Longmore (1966) and Küller, Ballal, Laike, Mikellides and Tonello (2006) demonstrated that there is a basic level of how people experience light as the most pleasant. A preference for light intensity depends on the situation, the task and one's surroundings (Biner, Butler, Fischer & Westergren, 1989; Butler & Biner, 1987; Van Bommel, 2003).
Light has a strong effect on the degree of arousal (Baron, Rea & Daniels, 1992; Daurat, Aguirre, Foret, Gonnet, Keromes & Benoit, 1993; Gifford, 1988; Kallman & Isaac, 1977; Miwa & Hanyu, 2006). Mehrabian suggested that '*brightly lit rooms are more arousing than dimly lit ones*' (Mehrabian, 1976, p. 89). Light also influences a shop's image and the stimulus to look at and scrutinize the merchandise (Areni & Kim, 1994; Baker, Grewal & Levy, 1992; Baker, Grewal & Parasuraman, 1994; Brengman & Geuens, 2004).

6.1.4 COLOUR AND LIGHT

Valdez and Mehrabian (1994) have shown that it is not only colour hue that determines the evoked emotions but also its saturation and brightness (i.e. intensity). It appears, for example, that although there is hardly any difference in the way men and women react to colour, women are more sensitive to the colour's brightness. In a study of non-chromatic colours (black-white-grey), it appeared that the brightness strongly determines their degree of stimulation and dominance (Valdez & Mehrabian, 1994). From a scenario study (Babin, Hardesty & Suter, 2003), in which a blue and an orange shop were compared, it appeared that the blue shop was preferred the most and that it generated a greater willingness to shop or buy there. A brightly-lit orange shop was perceived as having the greatest adverse effect. However, when soft lighting was introduced to this orange shop, it became almost as positively rated as the blue one. With a blue shop the effects are even more positive in a brightly-lit variation. The combination of light and colour seem to qualify the perceived effects quite convincingly. A restriction, however, is that this was a scenario study and its results should preferably also be tested in a realistic setting (Babin, Hardesty & Suter, 2003). Generally speaking, the studies on the effects of colour have predominantly focused on the wavelength of the colour and hardly at all on the brightness and the saturation of the colour (Valdez & Mehrabian, 1994; Brengman, 2002). Light and colour combined have seldom been investigated.

6.1.5 COLOUR, LIGHT AND TIME PERCEPTION

Smets (1969) demonstrated how people estimate the length of an interval as being shorter after having seen a red as opposed to a blue colour. Under red light time would appear to pass more slowly and objects seem bigger and heavier, whereas under blue light time seems to pass more quickly and objects look smaller and lighter. Casinos use this information and opt for red as basic colour which excites

the customers without their realizing that they are wasting a lot of time there (Singh, 2006). Research into the waiting time whilst downloading internet pages revealed that blue screens have a more calming effect than red or yellow ones and that time seemed to pass more quickly with the blue screen (Gorn, Chattopadhyay, Sengupta & Tripathi, 2004).
In the context of traditional – offline – shopping, Markin, Lillis and Narayana (1976) suggested that dimmed light calms customers, causing them to move more slowly through the shop, which means they can then take the time to scrutinize the merchandise. In order to stimulate impulse buying, Birren (1969) recommended using glaring lights. This suggests that the shopkeeper can use the intensity of light to keep customers in the shop for a longer or shorter period of time. As pleasant and stimulating colours combined with bright lighting appears to lengthen the perceived waiting time (Baker & Cameron, 1996), it would be better to opt for softer lighting and cooler colours so that people do not overestimate the actual wait.

6.1.6 INFLUENCE OF COLOUR AND LIGHT ON BEHAVIOUR

Besides the influence of colour on the emotions in the PAD model, colour and light also influence people's behaviour in a service environment. The assumption is that the three emotions affect the perception of the station on the following aspects: density, time perception and behaviour. Density, or rather perceived density, is influenced by one's sense of control (Hui & Bateson, 1991), whereby the space is experienced as less busy when the colours have a short wavelength (Russell & Mehrabian, 1974). The perceived waiting time is influenced by arousal and pleasure (Baker & Cameron, 1996; Bellizzi, Crowley & Hasty, 1983; Gorn et al., 2004; Singh, 2006;), and behaviour by pleasure, arousal and dominance (Mehrabian & Russell, 1974).

6.2 STUDY 1 FIELD STUDY: COLOUR AND LIGHT AT LEIDEN STATION[3]

6.2.1 INTRODUCTION

This field study examines whether colour in combination with light intensity on a platform can effect positive affective reactions from passengers and whether the degree of density on the platform has an influence on their experience. In this field study the roofing of one of the platforms at Leiden Central Station was lit with LEDs (Light Emiting Diodes) showing all the colours of the rainbow in a wavelike movement (Figure 6.1). Per measurement the light intensity was adjusted to high or low. The measurements were carried out in the evening, when it was dark, because the LED lighting was then more clearly visible and the light intensity could be more

3 This study was presented at the Colloquium Vervoersplanologisch Speurwerk (Van Hagen, Galetzka & Sauren, 2010).

easily manipulated owing to the absence of daylight. Besides LED lighting the platform was also lit by the regular fluorescent lighting, half of which was turned off when the light intensity was low. By projecting LED lights onto the white platform roofing, various colours and light intensities could be easily manipulated.

6.2.2 RESEARCH QUESTIONS AND HYPOTHESES

The aim of this study was to investigate how waiting passengers react to colour on a platform. The study focuses, moreover, on the question whether colour can influence the station evaluation and the waiting experience.

As mentioned before, reversal theory (Apter, 2007) poses that the need of environmental stimuli is dependent on the context, such as the degree of density on the platform. An environment that corresponds with the desired number of stimuli seems to effect an increase in customer satisfaction (Wirtz, Matilla & Tan, 2000). Reversal theory alleges that there are two suitable levels of stimulation: high and low (Apter, 2007, Chapter 4). If an individual finds him-/herself in a busy environment (rush hour), then the level of environmental stimulation is already so high that adding to it – in the form of colour – can cause too many stimuli and result in irritation and discomfort (Bellizzi, Crowley & Hasty, 1983). The same can apply to light intensity: a high level of lighting can lead to overstimulation. A combination of much light and colour evokes even more stimuli and the chance of overstimulation. This overstimulation can result in a lower hedonic tone. In a quiet environment, such as during off-peak hours or on a platform with a low light intensity, passengers are exposed to few stimuli whereby they can perceive the platform as bland and become bored. By purposely adding stimuli in the form of colour and light, the arousal level can be increased and passengers can experience greater pleasure. On the basis of reversal theory we expect an interaction between the degree of density and coloured light and between the degree of density and light intensity, hence our formulation of the following hypotheses:

***H1:** In a quiet environment colour affords more stimuli for passengers and initiates a more positive station and waiting experience.*

***H2:** In a busy environment colour affords too many stimuli for passengers and leads to a more negative station and waiting experience.*

***H3:** In an environment with little light, colour affords more stimuli for passengers and leads to a more positive station and waiting experience.*

***H4:** In an environment with a lot of light, colour affords too many stimuli for passengers and leads to a more negative station and waiting experience.*

6.2.3 METHOD

Experimental subjects and design

Of the 278 passengers who participated in this study, 41.3% were male and 58.7% female. The average age was 31.9 years (*SD* = 14.53, minimum 13, maximum 82 years).

The stimulus material consisted of seven colours that were alternately projected in rainbow-like fashion onto the white platform roofing (Figure 6.1). Also the light intensity on the platform varied between high (74 lux) and low (37 lux).

Figure 6.1 Manipulated colour of platform roofing

Procedure

The effect of the colour and light manipulation was measured by requesting train passengers to participate in an NS survey on station experience. For four consecutive days measurements were conducted on platform 1 of Leiden Central Station. The first two days measured a no-colour condition as control condition; the platform was then lit with white light, as in the normal situation, albeit the first day with a low and the second day with a high light intensity. On the third and fourth day the platform roofing was lit with various colours; on the third with a low and on the fourth with a high light intensity. This study was conducted at the end of November 2009 during evening hours in order for the light and colour manipulation to be clearly visible. Questionnaires were distributed in four trains, all of them leaving from the platform where the light had been manipulated. The reason why the questionnaires were not handed out before was so that respondents could not check to which colour and light intensity they had just been exposed. This also meant that the waiting experience was not influenced by filling in the questionnaire (i.e. a distracting task). The measurements were carried out in two trains during rush hour and two trains after the evening rush hour.

Measurements

The variables (with the exclusion of experience of time and the score) were measured with a 7-point Likert scale whereby 1 stood for 'completely disagree' and 7 'completely agree'. The station experience was measured with the following variables (Table 6.1 for scale values):

- *Pleasure, arousal, dominance*: The PAD emotions were measured on the basis of an adapted scale with bipolar items (7-point scale) (Russell & Mehrabian, 1974). For example: "Please indicate how you felt on the platform: pleasant-unpleasant." Pleasure was measured with 6 items (unhappy-happy, annoyed-pleased, unsatisfied-satisfied, melancholic-contended, despairing-hopeful, unpleasant-pleasant). Arousal was measured with three items (aroused-unaroused, relaxed-stimulated, calm-excited). Dominance was measured with three items (guided-autonomous, controlled-controlling, submissive-dominant).
- *General appreciation of platform*: This was measured with ten items – a combination of a station evaluation scale (used in studies of SENTA, 2005) and the Environmental Rating Scale of Bitner (1990). For example: "I feel welcome on the platform" and "The platform looks well cared for."
- *Platform score*: Experimental subjects were requested to award a score for their assessment of the quality of the platform (*1 = very poor, 10 = excellent*).

The waiting experience was measured with the following variables:

- *The time experience of the passengers:* The time experience at the station, on the platform and on the train were measured by the open question "How long (in minutes) do you think you were on the platform?" The cognitive waiting time assessment was determined by the question "How did you experience the time you spent waiting on the platform?" This was measured with a 7-point scale (*1 = very short, 7 = very long*).

- *Acceptance of the waiting time:* This was measured with the question "I found the waiting time on the platform: acceptable – unacceptable."
- *Utilitarian and hedonic waiting time:* The utilitarian waiting time (did one spend the time usefully, measured with five items) and the hedonic waiting time (did one spend the time pleasantly, measured with three items) were measured for the waiting time on the platform by using items of the Shopping Values of Batra and Ahtola (1991). Example utilitarian waiting time: "Was the time you spent waiting on the platform: useful–useless, valuable–worthless, etc." Example hedonic waiting time: "Was the time you spent waiting on the platform: pleasing - annoying, happy–sad, etc."

Finally, the following points were recorded:

- *Questions relating to the light and colour manipulation:* Respondents were asked which colour they had predominantly seen on the platform, whether the light on the platform was quite dark or quite bright (7-point scale), whether the colours on the platform were cool or warm (7-point scale), and whether the colours on the platform were quite grey or quite colourful (7-point scale).
- *Personal details:* Also several questions were asked relating to demographics, particulars on travel frequence and motive (must versus lust passenger), and whether one usually travels in peak or off-peak hours.
- *Extra information:* Finally the respondents were requested to indicate what time the train in which they were sitting had departed and whether it had been delayed. The questionnaire ended with a position on the weather: "I think the weather is fine today – I think the weather is dreadful today."

Table 6.1 Cronbach Alpha, Min., Max., M and SD of the dependent variables

	α	Min.	Max.	M	SD
STATION EXPERIENCE					
Pleasure	.90	1	7	4.50	1.06
Arousal	.73	1	7	3.38	1.07
Dominance	.83	1	7	4.22	.99
General appreciation environment	.89	1	7	4.01	1.04
Platform score	–	1	10	6.14	1.41
WAITING EXPERIENCE					
Time perception platform	–	0	20	3.83	5.47
Acceptance waiting time	–	1	7	4.57	1.42
Utilitarian waiting experience	.87	1	7	3.17	1.21
Hedonic waiting experience	.84	1	7	3.84	.98

6.2.4 RESULTS STUDY 1

Manipulation check

To determine whether the quiet or the busy platform was indeed perceived as such, we conducted a manipulation check. The perceived crowding scale (Harrell, Hutt & Anderson, 1980) was incorporated in the questionnaire with five items in order to ascertain the perceived density (e.g. "There are a lot of passengers on the platform"; $\alpha = .75$). An analysis of variance revealed that experimental subjects in the busy condition indeed judged the situation on the platform as being busier ($M = 4.51$, $SD = 1.10$) than experimental subjects in the quiet condition ($M = 4.08$, $SD = 1.10$), $F(1, 277) = 40.11$, $p = .000$).

Presence of colour

Of the experimental subjects 150 were in a condition with colour and 128 in a condition without. Experimental subjects found the colours on the platform more colourful in the colour condition ($M = 3.69$, $SD = 1.53$) than the platform without colour ($M = 2.65$, $SD = 1.24$), $F(1, 269) = 28.3$, $p = .000$). Also the colours on the platform with colour were perceived as being warmer ($M = 3.56$, $SD = 1.51$) than the platform without colour ($M = 2.67$, $SD = 1.20$), $F(1, 270) = 37{,}3$, $p = .000$). Experimental subjects evaluated a platform with colour as being more stimulating than a platform without.

Effects of colour, light intensity and density

A 2 (colour: none vs rainbow) x 2 (light intensity: high vs low) x 2 (density: busy vs quiet) multivariate analysis of variance (MANOVA; Wilks' Lambda) was conducted with dependent variables related to station experience: pleasure, arousal, dominance, evaluation platform and platform score. With the same independent variables we conducted a MANOVA on the dependent variables for waiting experience: subjective time platform, time experience platform, utilitarian waiting time, hedonic waiting time and acceptance of the waiting time. Corrections were made in both MANOVAs for the influence of the weather by including the assessment thereof as covariate. With the station experience significant differences were found between colour and light intensity ($F(5, 233) = 2{,}79$, $p = .018$). With the waiting experience a main effect was found for colour ($F(5, 211) = 3.41$, $p = .005$) and density ($F(5, 211) = 2.54$, $p = .03$). Also an interaction was found between colour x light intensity ($F(5, 211) = 2.56$, $p = .02$). In order to ascertain which effects occurred exactly, a number of univariate analyses of variance (ANOVAs) were conducted.

6.2.5 WAITING EXPERIENCE

It appeared that passengers with colour undergo a higher utilitarian waiting experience ($M = 3.32$, $SD = 1.24$) than without colour ($M = 3.02$, $SD = 1.22$, $F(1, 211) = 3.75$, $p = .05$), and during the rush hour passengers estimated their waiting time as being shorter (M = 03:42, SD = 05:12) than during off-peak hours (M = 04:28, SD = 05:45, $F(1, 211) = 6.24$, $p = .013$). For the waiting time experience an interaction was found with an ANOVA between colour and light intensity on the hedonic evaluation of the wait ($F(1, 235) = 4.40$, $p = .037$) and on the utilitarian evaluation of the wait ($F(1, 235) = 5.73$, $p = .001$). Table 6.2 shows the averages and standard deviations.

Table 6.2 Means (SDs) utilitarian and hedonic wait evaluation

	Light intensity	**Colour**	**No colour**
	M (SD)	*M (SD)*	*M (SD)*
Hedonic waiting time	Low	4.07 (.94)	3.60 (.84)*
	High	3.68 (.91)	3.78 (1.02)
Utilitarian waiting time	Low	3.59 (1.23)	2.96 (1.15)*
	High	3.11 (1.17)	3.07 (1.32)

Note: *Means with * differ significantly in the row, * p < 0.05.*

We see that passengers found waiting in a low light intensity more pleasant with colour than without ($F(1, 238) = 6.98$, $p = .009$). Passengers also found waiting in a low light intensity more useful with colour than without ($F(1, 241) = 7.52$, $p = .007$). These differences are non-significant for a high light intensity (Figure 6.2).

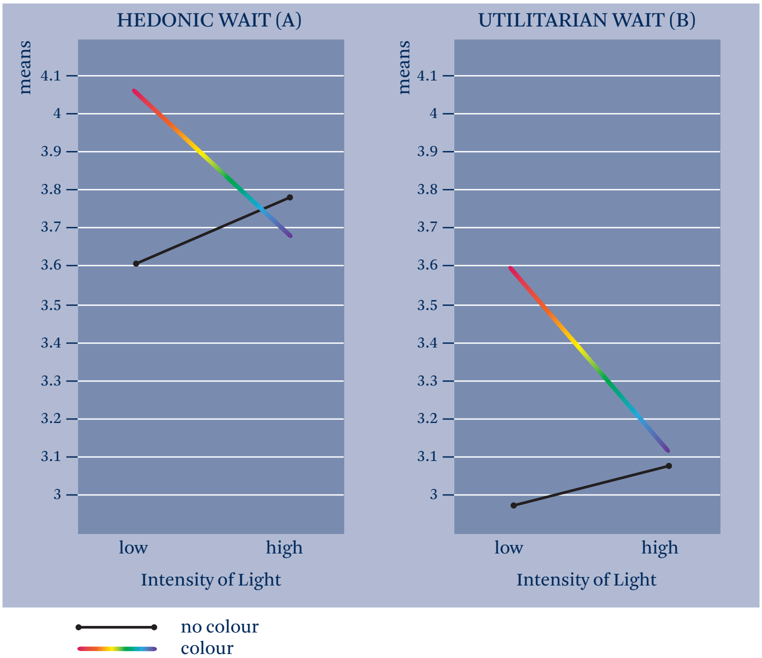


Figure 6.2 Interaction effects between colour and light intensity on hedonic (A) and utilitarian (B) evaluation of the waiting time

6.2.6 STATION EXPERIENCE

Colour and light also influence the station experience. ANOVAs revealed that colour in combination with a high or low light intensity has an effect on the experience of pleasure, arousal and dominance and in combination with density on the platform score (Table 6.3).

Table 6.3 Means and standard deviations colour and light intensity on station experience

	Light intensity	Density	Colour	No colour
			M (SD)	*M (SD)*
Pleasure	Low		4.67 (1.19	3.98 (.77)**
	High		4.40 (.91)	4.41 (1.11)
Arousal	Low		3.25 (1.01)	3.61 (.85)**
	High		3.53 (.95)	3.24 (1.16)*
Dominance	Low		4.48 (1.08)	4.12 (1.04)**
	High		4.16 (1.02)	4.30 (.94)
Platform score	Low	Low density	6.00 (1.55)	5.62 (1.13)
		High density	6.42 (1.42)	5.50(1.43)**
	High	Low density	6.16 (1.26)	5.85 (1.43)
		High density	6.09 (1.51)	6.62 (1.63)

Note: *Means with ** and * differ significantly in the row, ** $p < 0.05$, * $p < 0.1$.*

Pleasure: An ANOVA showed that in a situation with a low light intensity passengers experienced greater pleasure with colour than without ($F(1, 260) = 14.83$, $p = .000$). For a high light intensity this difference is non-significant. **Arousal**: An ANOVA between colour and brightness ($F(1, 234) = 5.84$, $p = .016$) showed that passengers with a low light intensity were stimulated more without colour than with ($F(1, 258) = 4.13$, $p = .043$). With a high light intensity passengers were stimulated only marginally more with colour ($M = 3.53$, $SD = .95$) than without ($F(1, 258) = 2.91$, $p = .089$). **Dominance**: An ANOVA revealed that passengers with a low light intensity also experienced greater control with colour than without ($F(1, 252) = 3.80$, $p = .05$). On a well-lit platform this difference was non-significant. The interactions are visualized in Figure 6.3.

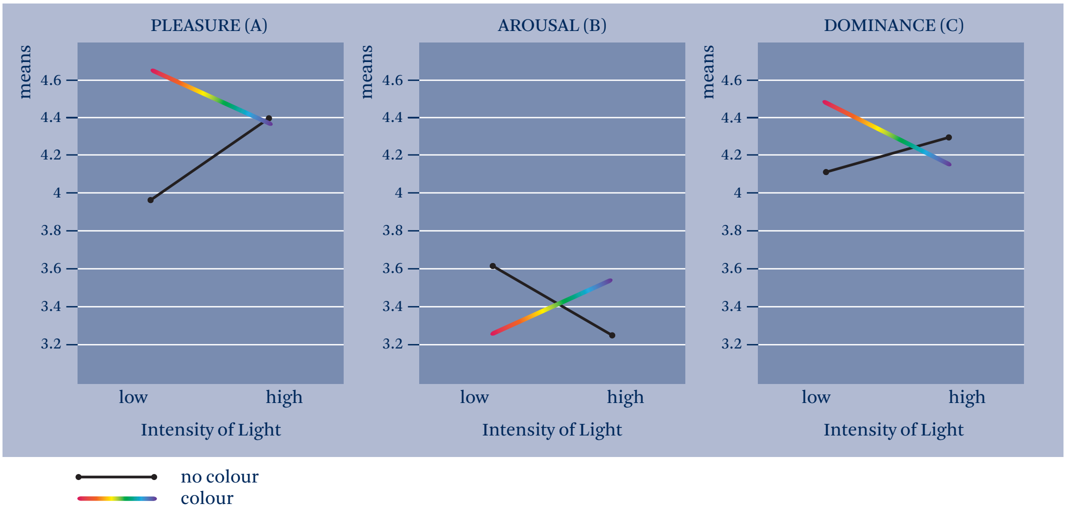


Figure 6.3 *Interaction between colour and light on pleasure (A), arousal (B) and dominance (C)*

Finally, an ANOVA showed a three-way interaction between colour and light on the passengers' score for the platform ($F(1, 259) = 4.08$, $p = .044$). It appeared that passengers with a low level of lighting and with many people on the platform with colour awarded a higher score than without colour ($F(1, 259) = 8.02$, $p = .005$). This difference was insignificant with a high light intensity or when the platform was quiet (Figure 6.4).

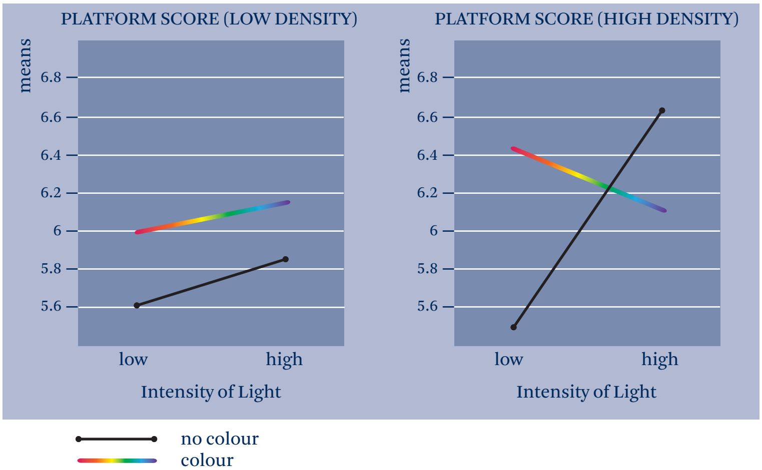


Figure 6.4 *Three-way interaction between colour, light intensity and density on the platform score*

6.2.7 RETURNING TO THE HYPOTHESES

Hypothesis 1 cannot be confirmed: *In a quiet environment colour affords more stimuli for passengers and initiates a more positive station and waiting experience*. In a situation in which it was quiet on the platform and the light intensity was low, no significant differences were found for station and waiting time experience. Possibly the differences between a busy and a quiet platform are not so great that passengers experience clear differences in station experience and waiting time experience in combination with colour.

Hypothesis 2 cannot be confirmed: *In a busy environment colour affords too many stimuli for passengers and leads to a more negative station and waiting experience*. It appeared that when it was crowded passengers awarded a higher score with colour than without in combination with a low light intensity. With a high light intensity and on a quiet platform, no differences were found for station or waiting time experience. Apparently, even in a busy situation with a low light intensity, the addition of colour is appreciated more by passengers (than without colour). One explanation might be that adding stimuli in the form of colour on a busy platform with little light has a positive effect, because passengers inherently expect to be understimulated on the platform. Adding extra stimuli makes the hedonic tone (score platform) rise. The greater appreciation may stem from an inexperience with colour on the platform.

Hypothesis 3 can be confirmed: *In an environment with little light, colour affords more stimuli for passengers and leads to a more positive station and waiting experience.* When the light intensity was high and colour was added, passengers experienced significantly greater arousal. They also experienced more arousal with a low light intensity and little light. The combination of colour and light is thus able to influence the number of experienced stimuli. Also a low light intensity in combination with colour appeared to result in more pleasure, more dominance and a higher score. This concurs with earlier findings in the literature (Brengman & Geuens, 2004; Valdez & Mehrabian, 1994). In line with these results, passengers experienced their waiting time as more pleasant and more useful. This confirms the proposition of Baker and Cameron (1996), in which they allege that a higher hedonic tone affords a more positive waiting time experience.

Hypothesis 4 cannot be confirmed: *In an environment with a lot of light, colour affords too many stimuli for passengers and leads to a more negative station and waiting experience.* With a high light intensity in combination with colour, no significant differences were found for the station and waiting experience. When there was little light present, a colourful platform was indeed positively assessed by passengers. We see no differences, however, when there was a lot of light. We can conclude from this that passengers waiting on a platform do not get overstimulated quickly by light in combination with colour. Maybe platforms are perceived as boring and that adding stimuli in the form of colour helps to positively influence the station and waiting experience. The differences found relate mainly to the interaction between colour and light and, to a lesser degree, between density, colour and light. The positive effects, moreover, apply predominantly to a situation with a low light intensity.

6.2.8 DISCUSSION

The aim of this field study was to examine the effect of colour and light intensity on passengers' station and waiting experience. Context plays an important role in reversal theory: in a busy, stimulating environment passengers have no need of extra stimuli, but in a quiet and barely stimulating environment, they are in contrast quite receptive to them. When passengers experience an optimal level of stimuli, the hedonic tone increases. A more positive hedonic tone has an effect on the waiting experience. If one is entertained, in any way, shape or form, then he/she will experience the wait more positively. The findings are in accordance with reversal theory. Not only does colour in combination with light result in a more positive station and waiting experience, whereby the colours on the platform are perceived as more stimulating, more colourful and warmer, but so, too, does the combination of colour and a low light intensity. Despite few differences being found between peak and off-peak hours, it would seem that even during rush hour passengers do appreciate colours. Apparently, there are so few stimuli on a platform that extra colour is positively embraced. Coloured light affords a more pleasant wait but has no influence on the waiting time perception. Neither the time estimation nor the time experience (short/long) was influenced by the coloured light. The explanation might lie in the fact that the alternating colours on the platform, although appreciated by passengers, might be too subtle to distract them from the time.

6.2.9 REMARKS AND RESTRICTIONS

A few methodological comments can accompany this field study. Different from most of the studies described in the literature, the manipulations in this study were not conducted by shining a specific light intensity onto coloured areas but by projecting coloured light onto the white roofing of the platform. Coloured light may well be perceived differently by experimental subjects than a coloured area on which light is shed. This may lead to different results.

Besides this, not the entire platform but only part of it was lit. However, the lit part was on the side where the passengers arrived on the platform, so every passenger was exposed to the coloured light. The fact that not the entire platform was lit but only part of it may be a reason why we did not find all the expected results. Maybe the exposure was too brief to realize substantial effects. A second comment concerns the fact that the train was often already waiting at the platform concerned before its time of departure. This meant that many passengers were able to get on straight away and were thus not only less exposed to the lighting but also that their waiting experience differed from if they had had to wait on the platform. This might also explain why hardly any differences were found between colour, light intensity and density. The reason why this platform was chosen for the study, despite the train already having arrived, was a practical one: on conducting this experiment, several saftey regulations had to be followed, i.e. the assembly and removal of the light installation was dangerous on other platforms where through trains passed (even at night).

6.2.10 PRACTICAL IMPLICATIONS FOR NS

The findings of this study offer insight into the application of coloured lighting on a platform and how the station evaluation and waiting experience of passengers can be influenced. With a lower light intensity, coloured light affords more pleasure, greater control and a more pleasant wait. Waiting passengers feel more relaxed and better in a colourful environment with a low level of lighting. With the colours receiving positive reactions in different situations, it can be argued that on platforms and in a waiting situation one can sooner speak of under- rather than overstimulation. We propose to deploy coloured lighting during both rush and off-peak hours, whereby the colours have the most positive effects when combined with a low light intensity.

6.3 STUDY 2 COLOUR AND TIME EXPERIENCE IN A VIRTUAL LAB[4]

6.3.1 INTRODUCTION

In the previously discussed field study we ascertained that colour in combination with light results in passengers more positively evaluating both the station and the waiting experience. In order to gain more insight into the effects of colour on a platform, our next two studies will take a closer look at more specific aspects of colour and light. Both studies were conducted in a virtual world, where we could influence the conditions more easily, i.e. restrict the influence of disturbing/interfering circumstances such as bad weather or delayed trains.

6.3.2 HYPOTHESES

In Chapter 4 we saw that people do not necessarily have to be aware of the environmental manipulation and in the field study we saw that adding colour in almost every situation results in a positive evaluation of the station. Colour appeared to have no effect on the waiting time perception, probably because the effects were too subtle to be noticed. It is also possible that people did not realize that the environment had a certain colour, regardless of its actual influence on the waiting experience. In the virtual world it is not only possible to compare the differences between colours, but also to ascertain whether the colour present is consciously

4 This study was presented at the European Transport Conference (Van Hagen, Pruyn, Galetzka & Peters, 2008).

perceived and whether the colour preference influences the experience. After all, our experimental subjects will be requested to fulfil a certain task and be unaware that various conditions at the station are being manipulated (*Introduction to the experimental studies).* Hence the following hypothesis:

***H1**: The majority of the respondents are unaware of the colour of the environment and the colour preference has no influence on the evaluation of the colour.*

In the introduction of this chapter we saw that the warmth of the colour can result in different effects, such as a short or longer perception of the waiting time (Gorn, Chattopadhyay, Sengupta, & Tripathi, 2004; Singh, 2006; Smets, 1969). To ascertain whether a colour's warmth can also influence the waiting experience in a station environment, we decided to examine how the wait is experienced on a platform lit by a cool colour (blue) and a red colour (warm). This resulted in the following hypothesis:

***H2:** Time on the platform seems to pass more quickly with the cool colour blue than with the warm colour red.*

6.3.3 DESIGN, PROCEDURE AND PARTICIPANTS

With the virtual world being used for this study (*Introduction to the experimental studies*), the experiment was carried out in the Virtual Reality Laboratory (VR lab) at the University of Twente (NL). The hypotheses were tested with a 2 (colour hue: red versus blue) between-subjects design, in which the platform roofing was either red or blue (Figure 6.6). The experiment ran for four consecutive days, during which the different conditions were arbitrarily distributed among the respondents. Those who had indicated they wished to take part in the experiment were first subjected to a test for colour blindness, after which they were invited – into a separate room – to practise with the navigation system used in the experiment. Subsequently, the respondents entered the VR lab where the final instructions were given. The experimental subjects sat at a table in a room in which the virtual world was projected onto a large screen (Figure 6.5). With the aid of a mouse they could move in the form of an avatar freely through the virtual station whilst being assigned to catch the train to Amsterdam. All the experimental subjects had the same amount of time for the exercise and their waiting time on the platform was determined by the speed with which they navigated through the station. The quicker they found their train, the longer their waiting time on the platform. After the simulation the respondent was requested to fill in a questionnaire. On completing it, (s)he was thanked for his/her time.
In total, 108 respondents (50 male and 58 female; average age 22; range 18-29 years), all Master/PhD students at the University of Twente, took part in the experiment. All 108 questionnaires were included in the final analyses. Twelve respondents previ-

ously dropped out due to colour blindness or because they had experienced mild nausea in the virtual environment.

Stimulus material

The virtual simulation was projected onto a 10-metre screen. Two stills (below) depict the simulation at the Virtual Reality Laboratory at the University of Twente (Figure 6.5) and the manipulation of the colours (Figure 6.6). After reading an instruction on the start page, participants could navigate through an animation of Leiden Station with a mouse and scroll arrows on a keyboard. They were instructed to: *"... get the first train to Amsterdam. Find out from which platform and at what time your train leaves. Wait on the platform until your train arrives. You have already got your ticket. Please try to envisage the situation and behave as you would in real life."* The avatar could then enter the station and freely navigate through the station from a first-person perspective, i.e. they were able to 'walk' through the station, climb the stairs and go onto the platform. Real-life background noises were played during the session to enhance imaginative power.

Figure 6.5 Experimental subject in virtual laboratory, study 1

The colours on the platform were manipulated: blue (colour code 000.128.255) and red (colour code 255.075.075). Level of saturation and light intensity was held constant for both conditions.

Figure 6.6 Colour conditions virtual laboratory

6.3.4 MEASUREMENT INSTRUMENT

The questionnaire was used to measure the overall evaluation of the station and the waiting time.

- *Station evaluation* was assessed by asking participants to evaluate the platform by awarding a score on a 10-point scale *(1 = very poor, 10 = excellent).*
- *Time perception:* Measures included subjective estimations of time spent at the station and on the platform. “If you had to guess, how long do you think you were at the station/on the platform (in minutes)?” The *cognitive evaluation of*

the waiting time (long/short) was measured with the question: "How did you experience the time spent at the station?" (1 = *very short*, 7 = *very long*).
– *Colour preference* was measured by asking the participant which colour they thought was the most appropriate for a station (grey, green, yellow, red or blue).
– *Perceived colour* was measured by asking participants what the main colour was that they had seen on the platform.

Also included were a number of demographic variables such as age, gender and gaming experience.

6.3.5 RESULTS COGNITIVE VERSUS AFFECTIVE PERCEPTION OF COLOUR

From the literature it was assumed that passengers have an idea of what they find suitable and appropriate on a platform and that cognition influences the way a person assesses an environment. Additional analyses were performed to gain insight into participants' preference. When asked which colour they thought was the most appropriate for a station (grey, green, yellow, red or blue), participants indicated a cognitive preference for the colour blue (37.1%) followed by the colour grey (19.2%). The colour red was with 18.5% the least appropriate colour for a station. Various one-way ANOVAs revealed that this preference had no influence on the overall evaluation of the station. That is to say that when one prefers blue, for example, on a platform, one does not necessarily appear to appreciate that platform more than someone who has a cognitive preference for another colour. It also appeared that only a small number of the participants could actually indicate which colour was dominant on the platform (28.7% grey, 25% blue and 17.6% red), suggesting that the effects of colour occur unconsciously. This result is in line with studies on automatic consumer behaviour which suggests that consumers are often unaware of environmental factors influencing their behaviour (e.g. Dijksterhuis, Smith, Van Baaren & Wigboldus, 2005) and it confirms hypothesis 1.

6.3.6 RESULTS TIME PERCEPTION

Time perception was included as a specific focus of interest in this study. Generally speaking, respondents estimated their time spent on the platform as significantly longer (M = 5:05, SD = 2:01) than the actual time (M = 3:19, SD = 0:29; $t(107) = 10.41$, $p < .00$). The Time Sense Factor (TSF) is the relationship between the objective waiting time and the perceived waiting time and is calculated by dividing – per experimental subject – the latter by the former (i.e. perceived waiting time ÷ objective waiting time). The result shows that the waiting time on the platform was overestimated (TSF = 1.59 (SD =.84)).
An ANOVA showed a main effect for colour on the short-long time experience ($F(1, 106) = 4.73$, $p = .03$). With time experience we see a difference between the blue platform (M = 3.34, SD = 1.46) on the one hand, and the red (M = 4.02, SD = 1.79) on

the other. These results show that on a blue platform time passes relatively faster than on a red one. This confirms hypothesis 2.

6.3.7 CONCLUSIONS VR LAB

Although passengers have a definite cognitive preference for the colour blue, it appeared that not even 20% of the respondents could indicate which colour was dominant on the platform. In all situations the colour one thought to have seen most often was grey. Apparently, passengers cling to the image they have of a platform and it seems that colours are perceived unconsciously. For colour and station evaluation, affective effects are thus more important than cognitive ones. According to results found in the literature (Gorn, Chattopadhyay, Sengupta, & Tripathi, 2004; Singh, 2006; Smets, 1969), time in a blue environment appears to pass faster than in a red one. Now we have seen that colour can influence the waiting experience, and unconsciously also the station evaluation, it will be interesting to examine whether interaction effects can also be found in the virtual world. As this entails a more complex research design and requires more experimental subjects, we thus decided to hold the virtual world study online from respondents' homes.

6.4 STUDY 3 VIRTUAL STATION ONLINE STUDY[5]

6.4.1 INTRODUCTION

In order to test an elaborate research design, a virtual laboratory is not the optimal research instrument. Only one respondent at a time can sit in a VR lab, which is laborious and time- consuming. Moreover, it is not easy to recruit sufficient respondents who are willing to travel to the lab. The advantage of an online study is that many experimental subjects can participate and that the time it demands of them remains limited because it does not involve travel time to the lab. There is also greater flexibility and the duration of the study is shorter, because the experimental subjects can log in to the virtual world from home at any given moment and their answers are automatically stored in an SPSS file. These advantages allow for simulation of more conditions.
It appeared from the field study that colour in combination with light can result in a more positive station and waiting experience and the VR lab study illustrated how colours can influence the time experience without them being consciously perceived. In the field study hardly any effects were found between density and colour or density and light intensity, despite our high expectations to find differences. Maybe the difference in density was too marginal on the platform where the field study was conducted. So to allow for sufficient discrimination, we also

5 This study was presented at the European Transport Conference (Van Hagen, Pruyn, Galetzka & Peters, 2008).

manipulated density in the second virtual study, besides manipulating the goal-orientedness by means of a scenario (*Introduction to the experimental studies*).
The online study used the same virtual environment as in the VR lab and NS panel members could log in to the virtual station from their own personal computer. NS panel members are people who have agreed to participate several times a year in NS research (Appendix 1). The virtual station and the task given to the experimental subjects were identical to the first virtual study, albeit that the (warm) colour yellow was now added to the research design as this is one of NS's corporate colours. In the online study, besides the three colours, not only the brightness of the light but also density was simulated by placing many or few people on the platform (Figure 6.7). Experimental subjects were also asked to envisage themselves in a goal-oriented or less goal-oriented scenario before entering the virtual world (*Introduction to the experimental studies*).

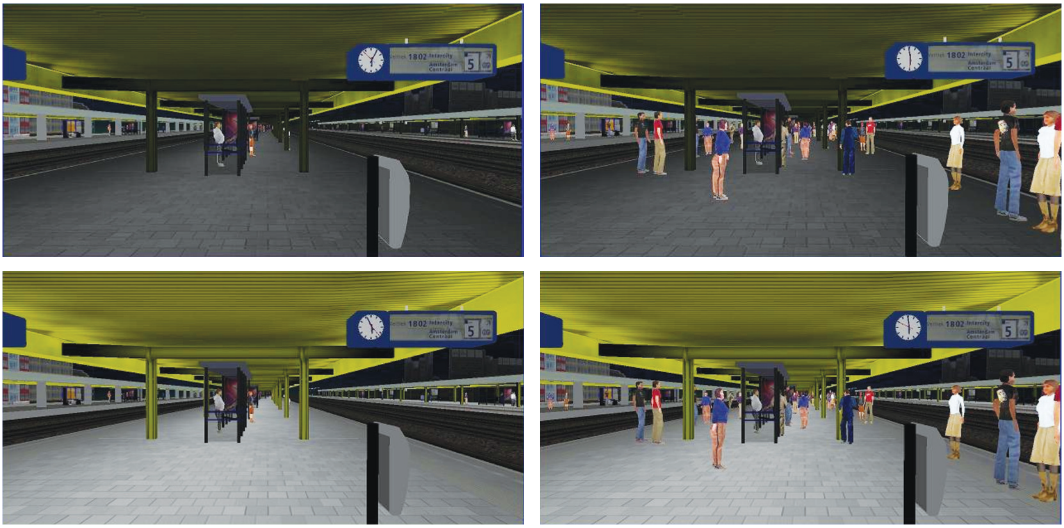


Figure 6.7 Yellow platform x light intensity (above low, below high) x density (left low density, right high density)

6.4.2 HYPOTHESES

On the basis of Apter's reversal theory (2007; Chapter 4), we expect goal-oriented must passengers to want to avoid too many stimuli. They are, after all, in the *telic state* and are concentrated on catching their train, whereby too many stimuli will induce more stress and a lower hedonic tone. Lust passengers, on the other hand, will be more receptive to environmental stimuli; they are in the *paratelic state*, are less goal-oriented and are receptive to any distraction from boredom. Hence the following hypotheses:

***H1:** A warm colour affords more stimuli and initiates a more positive station and waiting experience for lust passengers.*

***H2:** A cool colour affords fewer stimuli and initiates a more positive station and waiting experience for must passengers.*

Also density and light intensity can influence the station evaluation and time experience. In a busy environment, the sense of control can decrease and lead to stress (Chapter 4), so having a clear (over)view is of paramount importance, which in turn necessitates a higher level of lighting (Van Bommel, 2003; 2004). In a quiet and less task-directed environment, the brightness of the lighting is less relevant and too much may even overstimulate. We thus expect that a low level of lighting in a quiet environment and a high level in a busy environment will positively effect the hedonic tone and the waiting experience. Hence:

***H3:** In a quiet environment with little light, colour affords fewer stimuli to passengers and this leads to a more positive station and waiting experience.*

***H4:** In a busy environment with a lot of light, colour affords too many stimuli to passengers and this leads to a more negative station and waiting experience.*

6.4.3 DESIGN, PARTICIPANTS AND PROCEDURE

A 3 (colour: blue vs red vs yellow) x 2 (light: high vs low light intensity) x 2 (time: off-peak vs peak) x 2 (kind of passenger: must vs lust passenger) between-subjects design was marked out to answer the specified hypotheses. The virtual environment and the questionnaire from study 1 were converted to an online version that was put to the NS panel. Panel members received an e-mail in which they were asked to participate in the survey. Respondents could log in at any time and via a link they arrived at an introduction page where they were asked to download the software VirtuoCity 2.4, which was essential to run the virtual model. Each respondent was randomly assigned to one of the 24 conditions. When the assignment had been completed, the respondent was redirected to the questionnaire and on completion thanked for his/her time. In total 1,326 respondents (56.6% male, 43.4% female) were asked to navigate through the online simulation.

Measures

– *Emotions* were measured on the basis of the Pleasure Arousal Dominance (PAD) scale (Mehrabian & Russell, 1974). Pleasure was measured with 6 items (unhappy-happy, annoyed-pleased, unsatisfied-satisfied, melancholic-contented, despairing-hopeful, unpleasant-pleasant; Coefficient Alpha = .92). Arousal was measured with 6 items (stimulated-relaxed, excited-calm, frenzied-sluggish, jittery-dull, wide awake-sleepy, aroused-unaroused; Coefficient Alpha = .72). Dominance was measured with 6 items (controlled-controlling, influenced-influential, cared for-in control, awed-important, submissive-dominant, autonomous-guided; Coefficient Alpha = .76).

- *Station evaluation*. Station evaluation was assessed by asking participants to evaluate the platform by awarding a score on a 10-point scale *(1 =very poor, 10 = excellent).*
- *Utilitarian and hedonic waiting time* was measured on the basis of the shopping values (Batra & Ahtola, 1991), which measure both the *hedonic* (3 items, 7-point Likert scale Coefficient Alpha = .92) and *utilitarian* time appreciation (3 items, 7-point Likert scale, Coefficient Alpha = .87). An example of utilitarian waiting time: "Was the time you spent waiting on the platform: useful–useless, valuable–worthless, etc.?" An example of the hedonic waiting time: "Was the time you spent waiting on the platform: pleasing–annoying, happy–sad, etc.?"
- *Acceptable wait* was measured with one item: "The time I spent on the platform was: (1) *unacceptable* to (7) *acceptable*."

A manipulation check was included in the questionnaire on the perceived density on the platform, the perceived colour, the light intensity and realism of the simulation. Also included were a number of demographic variables.

6.4.4 RESULTS STUDY 3

Manipulation Check

Perceived density was measured with the aid of the perceived crowding scale (Harrell, Hutt & Anderson, 1980), which consists of 7 items. Examples: "There are many passengers on the platform" and "On the platform I am limited in my freedom of movement" (*1 = totally disagree, 7 = totally agree*; Coefficient Alpha = .79). The manipulation check confirmed that during peak hours, the station was rated as much more crowded ($M = 3.8$, $SD = .92$) compared to off-peak hours ($M = 3.01$, $SD = .93$, $F\,(1, 1314) = 235.4$, $p = .000$).

MANOVA station experience and waiting experience

A 3 (colour: blue vs yellow vs red) x 2 (light intensity: low vs high) x 2 (passenger type: must vs lust) x 2 (density: busy vs quiet) multivariate analysis of variance (MANOVA) was conducted with the dependent variables related to both station experience (pleasure, arousal, dominance, score platform) and to waiting experience (acceptable waiting time, utilitarian assessment waiting time, hedonic assessment waiting time, time perception and time experience). The results can be found below (Table 6.4).

Table 6.4 MANOVA (Wilks' Lambda) for variables station and waiting experience

	Variables station experience			Variables waiting experience		
	F	*df*	*p*	*F*	*df*	*p*
Colour	1.52	8, 2554	*ns*	<1	10, 2512	
Light intensity	2.78	4, 1277	**.03**	1.93	5, 1256	.09
Passenger type	2.99	4, 1277	**.02**	1.24	5, 1256	*ns*
Density	<1	4, 1277		<1	5, 1256	
Colour * light intensity	1.42	8, 2554	*ns*	1.34	10, 2512	*ns*
Colour * passenger type	2.05	8, 2554	**.03**	1.66	5, 1256	.08
Light intensity *passenger type	<1	4, 1277		2.51	10, 2512	**.03**
Light intensity * density	1.94	4, 1277	.10	2.76	5, 1256	**.03**
Colour * density	<1	8, 2554		<1	10, 2512	
Passenger type * density	1.37	4, 1277	*ns*	2.25	5, 1256	.06
Colour * light intensity * passenger type	<1	8, 2554		1.02	10, 2512	*ns*
Colour * light intensity * density	1.16	8, 2554	*ns*	1.04	10, 2512	*ns*
Colour * passenger type * density	2.25	8, 2254	**.02**	<1	10, 2512	
Light intensity * passenger type * density	<1	4, 1277		<1	5, 1256	
Colour * light intensity * passenger type * density	<1	8, 2554		1.16	10, 2512	*ns*

Note: *ns = non-significant*

6.4.5 STATION EXPERIENCE

The MANOVA for station experience revealed significant main effects for light intensity and passenger type. A two-way interaction was also found between colour and passenger type and a three-way interaction between colour, passenger type and density (Table 6.4). As follow-up analysis we thus conducted various univariate analyses of variance (ANOVAs) to ascertain which effects precisely occurred.

Main effects light intensity and passenger type for station experience

An ANOVA showed that passengers experienced more *pleasure* with a low light intensity ($M = 4.58$, $SD = 1.05$) than with a high light intensity ($M = 4.40$, $SD = 1.04$, $F(1, 1321) = 9.63$, $p = .002$). The same applied to *dominance*: passengers experienced more *dominance* with a low light intensity ($M = 4.34$, $SD = .73$) than with a high light intensity ($M = 4.22$, $SD = .74$, $F(1, 1313) = 7.99$, $p = .005$). Another ANOVA revealed that lust passengers experienced more *dominance* ($M = 4.33$, $SD = .73$) than must passengers ($M = 4.23$, $SD = .75$, $F(1, 1313) = 5.58$, $p = .018$).

Interactions between colour and passenger type

An ANOVA revealed an interaction between colour and passenger type on *pleasure* (F (2, 1317) = 7.02, p = .005) and on *arousal* (F(2, 1309) = 5.79, p = .003). Table 6.5 shows the means and standard deviations and Figure 6.8 the interactions on *pleasure* (Figure 6.8 A) and *arousal* (Figure 6.8B). For *arousal* an ANOVA showed that must passengers were less stimulated by the colour yellow than by the colours red and blue (F(2, 1309) = 7.55, p = .001). No significant differences were found for lust passengers. Lust-passengers found the colours yellow and red more pleasant than must passengers (F(2, 1317) = 4.17, p = .016), who found the colour blue the most pleasant (F(2, 1317) = 3.13, p = .044).

Table 6.5 Means (and standard deviations) of colour and passenger type for pleasure, arousal and platform score (Low and High density)

		Must			Lust		
		Blue	**Yellow**	**Red**	**Blue**	**Yellow**	**Red**
		M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Pleasure		4.56 (1.07)^{a}	4.28 (1.04)^{ae}	4.46 (.99)^{e}	4.38 (1.15)^{bc}	4.68 (1.04)^{b}	4.58 (1.02)^{c}
Arousal		4.59 (.89)^{a}	4.23 (.95)^{ab}	4.51 (.84)^{b}	4.48 (.96)	4.55 (.89)	4.49 (.82)
Pleasure	**Low density**	4.63 (1.04)^{ab}	4.24 (1.14)^{a}	4.33 (.88)^{b}	4.29 (1.15)^{cd}	4.75 (1.07)^{c}	4.71 (.99)^{d}
	High density	4.45 (1.09)	4.31 (.96)^{e}	4.59 (1.07)^{e}	4.53 (1.15)	4.63 (1.02)	4.51 (1.06)
Platform score	**Low density**	6.82 (1.36)^{e}	6.49 (1.52)^{e}	6.69 (1.25)	6.58 (1.34)^{ab}	7.04 (.88)^{a}	6.89 (1.13)^{b}
	High density	6.87 (1.32)	6.85 (1.22)	6.87 (1.24)	6.85 (.98)	6.77 (1.34)	6.71 (1.44)

Note: *Means with identical superscripts (^{a,b,c,d} and ^{e}) differ significantly in the row:* ^{a,b,c,d} $p < 0.05$, ^{e} $p < 0.1$

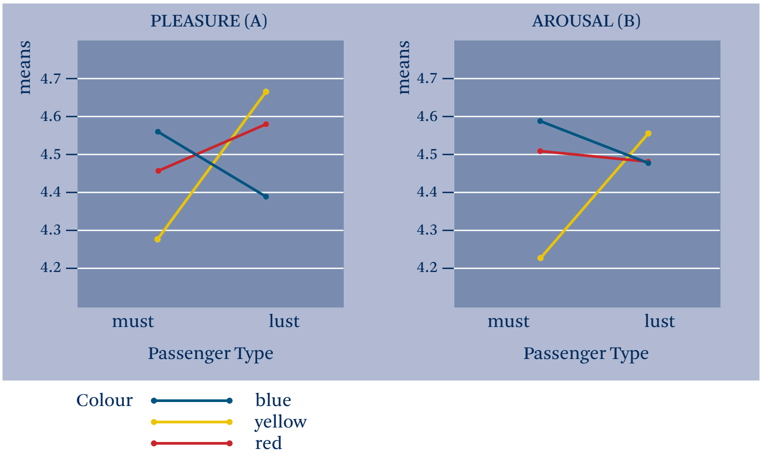


Figure 6.8 Interaction between colour and passenger type on pleasure (A) and arousal (B)

Interactions between colour, passenger type and density

An ANOVA revealed a three-way interaction between colour, passenger type and density ($F(2, 1311) = 6.51$, $p = .002$) on *pleasure*. Table 6.5 shows the average values and standard deviations. It appeared that at quiet moments lust passengers experienced greater *pleasure* with the colours yellow and red than with the colour blue ($F(2, 1311) = 7.29$, $p = .001$), whereas at quiet moments must passengers experienced greater *pleasure* on a blue than on a yellow or red platform ($F(2, 1311) = 1.88$, $p = .015$). At busy moments no differences were observed.

Finally, an ANOVA revealed a three-way interaction between colour, passenger type and density on the *platform score* ($F(2, 1303) = 2.83$, $p = .059$). Table 6.5 shows the average values and standard deviations and Figure 6.9 visualizes the interaction. It appeared that at quiet moments lust passengers appreciated yellow on the platform more than blue ($F(2, 1303) = 3.68$, $p = .026$). Although the results point in the right direction, we did not find any significant differences between the colours yellow and blue for must passengers ($F(2, 1303) = 1.50$, $p = ns$, Figure 6.9). The findings are in accordance with reversal theory, which alleges that lust passengers are more receptive to environmental stimuli than must passengers.

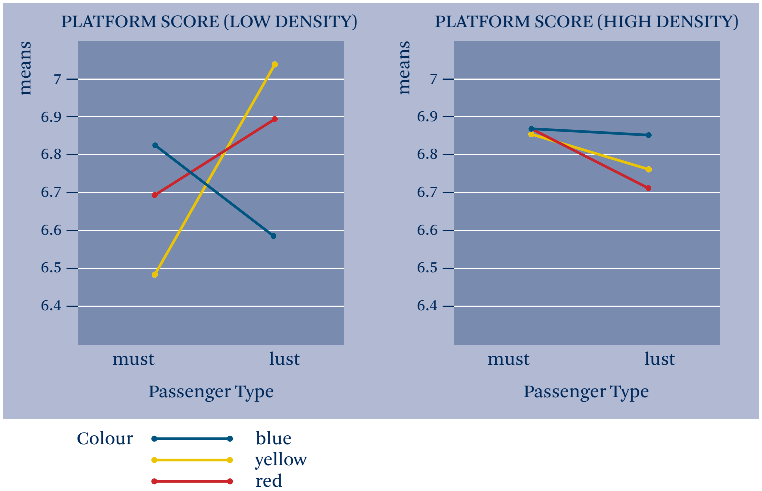


Figure 6.9 Three-way interaction between passenger type, density and colour on platform score

6.4.6 WAITING EXPERIENCE

A MANOVA (Table 6.4) on waiting experience found interactions between passenger type and light intensity and between light intensity and density. Moreover, a marginal interaction effect was found between colour and passenger type and density and passenger type (Table 6.4). A number of ANOVAs were conducted to discover which effects occur for colour and light.

Interactions between colour and passenger type

An ANOVA revealed that the combination of colour and passenger type does indeed influence both the *hedonic assessment of waiting time* ($F(2, 1310) = 6.77$, $p = .001$) and the *utilitarian assessment of waiting time* ($F(2, 1311) = 3.28$, $p = .04$). The Means (and *SDs*) can be seen in Table 6.6. The results are also visualized in the interaction plots of Figure 6.10, in which yellow and blue are again the more dominant.

Table 6.6 Means (SDs) of colour on pleasant and useful waiting time assessment (for must and lust passengers)

		Blue	Yellow	Red
		Means (SD)	Means (SD)	Means (SD)
Hedonic waiting time assessment	**Must**	4.09 (0.94)^{b}	3.85 (1.02)^{bc}	4.06 (1.03)^{c}
	Lust	3.89 (1.07)^{ad}	4.18 (0.96)^{a}	4.05 (0.93)^{d}
Utilitarian waiting time assessment	**Must**	3.52 (1.12)	3.39 (1.12)	3.47 (1.12)
	Lust	3.36 (1.14)^{bc}	3.64 (1.11)^{b}	3.57 (1.09)^{c}

Note: *Means with identical superscripts (^{a,b,c} and ^{d}) differ significantly in the row:* ^{a} *p < 0.001,* ^{b,c} *p < 0,05,* ^{d} *p < 0.1*

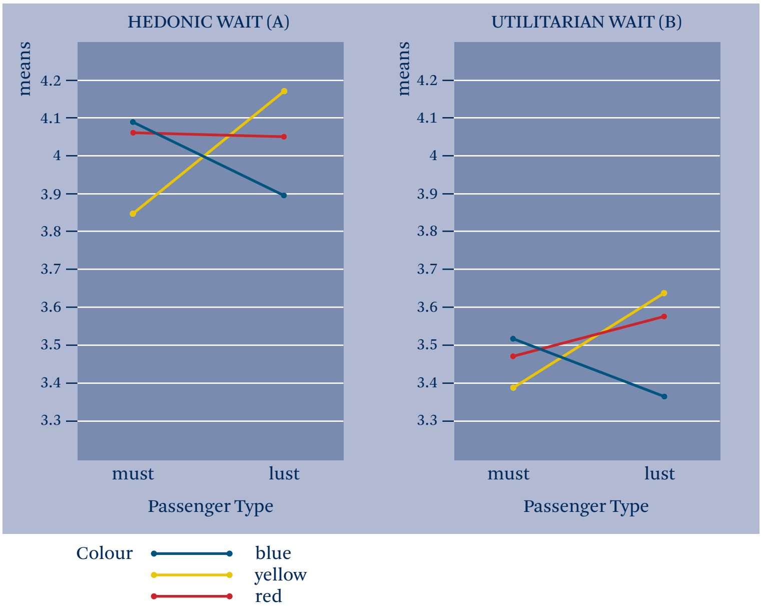


Figure 6.10 Interaction effect of colour and passenger type on hedonic (A) and utilitarian (B) wait

Lust passengers experienced the waiting time on the yellow platform as more pleasant ($F(2, 1310) = 4.26$, $p = .014$) and more useful ($F(2, 1311) = 3.43$, $p = .033$) than on the blue platform. In contrast, must passengers experienced a more pleasant waiting time ($F(2, 1310) = 3.06$, $p = .047$) on the blue platform than on the yellow one.

The results for colour on station and time experience support reversal theory. Must passengers are serious and plan their journey ahead. Consequently, this group demands fewer external stimuli. Lust passengers, on the other hand, are more relaxed, more spontaneous and whimsical, which becomes apparent from their greater need for stimuli. According to reversal theory (Apter, 2007; Walters, Apter & Svebak, 1982), a desire for stimuli goes hand in hand with a preference for colour. Must passengers prefer colours with a short wavelength (i.e. blue), whereas lust passengers tend to opt for more stimulating colours, i.e. with a long wavelength (i.e. yellow).

Light intensity and waiting experience

The MANOVA on waiting experience showed a marginally significant main effect on light intensity. Hence, as a follow-up analysis, we conducted several ANOVAs.

Main effects light intensity on waiting experience

The ANOVAs revealed significant effects for the *utilitarian waiting time assessment* ($F(1, 1315) = 5.35$, $p = .02$), the *acceptance of the waiting time* ($F(1, 1322) = 7.61$, $p = .01$), and the *short/long waiting experience* ($F(1, 1317) = 6.13$, $p = .01$). The averages and standard deviations can be seen in Table 6.7. It appeared that with a low light intensity the waiting time was not only experienced as being more useful and more acceptable but that it also appeared to last less long than with a high light intensity.

Interactions light intensity and density

ANOVAs showed that the combination of light intensity and density also influences the *acceptance of the waiting time* ($F(1, 1320) = 8.90$, $p = .003$) and the *waiting experience* ($F(1, 1315) = 5.58$, $p = .018$). The averages and standard deviations can be found in Table 6.7.

Figure 6.11 shows that on a busy platform the light intensity has hardly any influence on the acceptance of the waiting time or how the duration thereof is experienced. However, on the quiet platform, the waiting time is experienced as more acceptable with a low rather than a high light intensity ($F(1, 1320) = 16.1$, $p = .000$). Also the time on a quiet platform seems to take less long with a low versus a high light intensity ($F(1, 1315) = 11.83$, $p = .001$). In quiet periods, a low light intensity would thus seem to result in positive effects for the waiting experience.

Table 6.7 Mean scores (SDs) for light intensity on utilitarian wait, acceptable wait and short/long experience of the wait on platform with low and high density

		Low light intensity	High light intensity
		Mean (SD)	Mean (SD)
Utilitarian wait		3.56 (1.12)	3.43 (1.12)*
Acceptable wait		5.79 (1.13)	5.59 (1.43)**
Experience of the wait (*1 = short, 7 = long*)		3.37 (1.76)	3.62 (1.85)**
Acceptable wait	**Low density**	5.90 (1.27)	5.49 (1.41)**
	High density	5.70 (1.32)	5.74 (1.43)
Experience of the wait (*1 = short, 7 = long*)	**Low density**	3.24 (1.80)	3.71 (1.80)**
	High density	3.49 (1.71)	3.48 (1.91)

Note: *Means with ** and * differ significantly in the row: ** p < 0.001, * p < 0.05.*

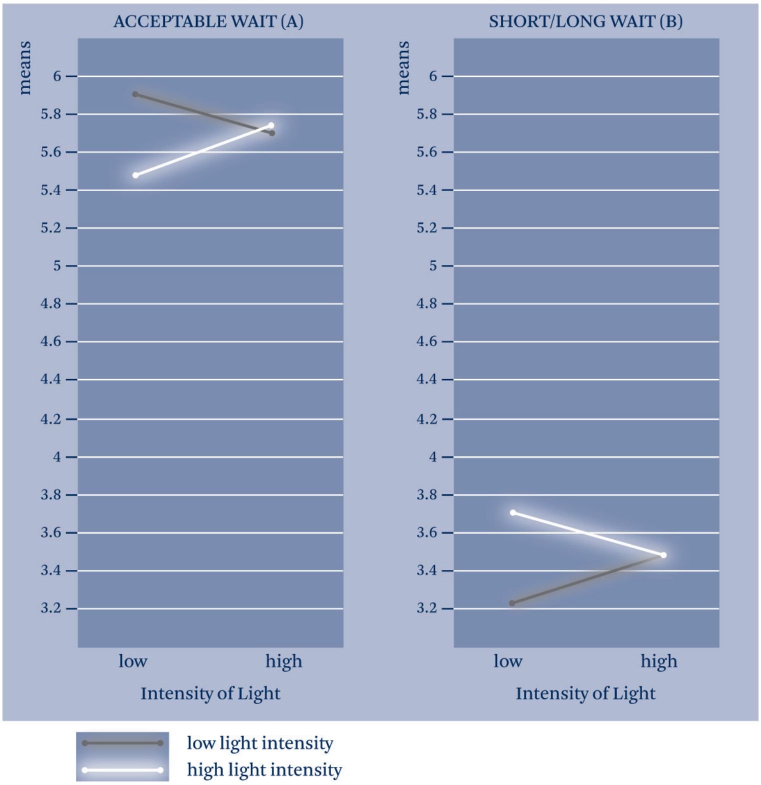


Figure 6.11 Interactions between light intensity and density on acceptable wait (A, 1 = unacceptable, 7 = acceptable) and waiting time and experience of the wait (B, 1 = short, 7 = long)

What is remarkable is that despite the positive affective evaluation of the lower light intensity, 92.6% of the experimental subjects claimed to have a (cognitive) preference for a station with a high light intensity.

6.4.7 RETURNING TO THE HYPOTHESES

Hypothesis 1 is confirmed: *A warm colour affords more stimuli and initiates a more positive station and waiting experience for lust passengers.* Regardless of the light intensity with the yellow colour, lust passengers appeared to experience more arousal and greater pleasure with the warm colours red and yellow. On a yellow platform lust passengers not only experienced the waiting time as being both more pleasant and useful but they also awarded a higher score to the (quiet) platform with the red and yellow colour. Must passengers, on the other hand, experienced more pleasure with the blue colour, as well as finding the wait more pleasant.
Hypothesis 2 is confirmed: *A cool colour affords fewer stimuli and initiates a more positive station and waiting experience for must passengers.* With the blue colour, must passengers experienced more stimuli than lust passengers and more pleasure on a blue platform than on a yellow one. Must passengers also awarded the (quiet) blue platform a higher score and claimed to find waiting on the blue platform more pleasant than on the yellow one. These findings support reversal theory: must passengers prefer to wait in cool colours, just as lust passengers prefer to wait in warm colours.
Hypothesis 3 is confirmed: *In a quiet environment with little light, colour affords fewer stimuli to passengers and this leads to a more positive station and waiting experience.* Regardless of the colour, a quiet platform with a low light intensity affords a more positive waiting experience than a quiet platform with a high light intensity. Waiting on a quiet platform with a low light intensity is not only deemed as being more acceptable but also the wait seems to be shorter.
Hypothesis 4 cannot be confirmed: *In a busy environment with a lot of light, colour affords too many stimuli to passengers and this leads to a more negative station and waiting experience.* With a high light intensity combined with colour, no differences were found for the waiting experience when the platform was quiet or busy. Light intensity and colours have thus no effect on the waiting experience combined with density.

6.4.8 CONCLUSIONS VIRTUAL STUDY

After analysing the results per scenario, the preference for colour appears on whether one is a must or lust passenger (and thus in a hurry or not). The findings from this study support Apter's reversal theory (Apter, 2007; Walters, Apter & Svebak, 1982), which alleges that people under pressure prefer cool colours and in a relaxed situation incline towards warm ones. Needing a colour thus appears to be dependent on the demand for stimuli, whereby lust passengers prefer warm colours and must passengers cool ones.

Also, the results particularly show positive effects in dimmed situations. Dimly lit surroundings appear to evoke more positive affective reactions to the waiting time and the acceptance of the waiting time than when the lights are brighter. Moreover, time seems to pass more quickly in dimly lit situations than when the lights are brighter. This confirms the findings of Baker and Cameron (1996). Apparently, a lot of light in a waiting situation is too aggravating, despite passengers having a cognitive preference for a high light intensity. It may be that they feel that a high light intensity offers greater safety. However, research by Van Bommel (2001; 2003; 2004) shows that it is not the intensity of the light that is important but the way it is shed, i.e. being able to see the faces of others.
The results show that manipulations in a virtual retail environment successfully allow effects with colour, light, density and time pressure to be demonstrated and that the findings are comparable with those from the field study.

6.5 CONCLUSION OF THE THREE STUDIES

The findings of the three studies offer an initial insight into the way colour and light work in a railway station. Generally speaking, the conclusion is that platforms are experienced as boring, grey and unappealing and that adding colour generates positive effects, both on the station evaluation and on the waiting experience (Van Hagen, Galetzka & Sauren, 2010; Van Hagen, Pruyn, Galetzka & Peters, 2008). As also became apparent from earlier research, colour and light intensities afford interactions (Babin, Hardesty & Suter, 2003; Brengman & Geuens, 2004; Mehrabian, 1976; Valdez & Mehrabian, 1994). The findings of the studies reveal that the hedonic tone and the waiting experience can be influenced by the combination of colour and light but that this depends on the context. From the field study it became apparent that colour, particularly with a low light intensity (as compared with a high light intensity), results in a positive station experience. Also in the virtual online study, low light intensity yielded positive results for station and waiting experience, particularly when the platform was quiet. The same study also revealed that time seemed to take less long and was more acceptable in dimmed lighting when the platform was quiet. The required level of lighting depends on the task to be performed; the more complex the task, the more lighting it requires (Biner, Butler, Fischer & Westergren, 1989; Butler & Biner, 1987; Van Bommel, 2001; 2003; 2004). Earlier research also showed that people feel the most comfortable with a certain level of lighting (Baker & Cameron, 1996; Hopkinson, Petherbridge & Longmore, 1966; Küller, Ballal, Laike, Mikellides & Tonello, 2006). Light intensity, moreover, has an effect on the level of arousal (Baron, Rea & Daniels, 1992; Daurat, Aguirre, Foret, Gonnet, Keromes & Benoit, 1993; Gifford, 1988; Kallman & Isaac, 1977; Mehrabian, 1976; Miwa & Hanyu, 2006). Apparently, when passengers have to wait on a platform they experience too many light stimuli as negative and prefer dimmed lighting.

The virtual studies also revealed that time in a cool colour seems to go faster than in a warm colour and that must passengers prefer the cool colour blue on a platform. In contrast, lust passengers experience greater pleasure with the warm colours red and yellow. The shorter time perception with the colour blue concurs with findings from earlier studies (Gorn, Chattopadhyay, Sengupta, & Tripathi, 2004; Singh, 2006; Smets, 1969). Cool colours such as blue and green are seen to be calming and warm colours such as yellow and red are seen to be stimulating (Adams & Osgood, 1973; Jacobs & Suess, 1975; Valdez & Mehrabian, 1994; Walters, Apter & Svebak, 1982; Wexner, 1954). With task-related activities, cool colours are preferred to warm colours that evoke negative emotions (Kwallek et al., 1988; in Stone & English, 1998; Walters, Apter & Svebak, 1982). However, people are attracted to warm colours (Belizzi, Crowley & Hasty,1983). Hence the explanation that passengers who are waiting and not performing a task are more receptive to the more stimulating warm colours and less goal-directed passengers prefer the colour blue because it is less distractive.

In all three studies *optimal arousal theory* applies: too few or too many stimuli lead to a more negative hedonic tone, just as an optimal level of stimuli leads to a positive hedonic tone. The context appears to be of importance here. In reversal theory, two levels of optimal stimuli can be distinguished, depending on the *state* of the experimental subject. In accordance with reversal theory, goal-oriented (must) passengers appear to react more positively to cool colours, whereas less goal-oriented (lust) passengers prefer warmer colours. From the interaction effects between colour and light, the number of stimuli appear to be complementary: particularly in a quiet environment, a low level of lighting and colours result in a more positive hedonic tone and a more positive waiting experience. It would seem that an optimal level of stimuli, with a correct mix of light intensity, stimulation of the colours and density, provides a congruent *processing fluency*, whereby people feel more comfortable (Van Rompay & Pruyn, in press). If the number of stimuli is *mildly incongruent,* the optimal level of stimulation in various situations is achieved (Eroglu, Machleit & Chebat, 2005; Heckler & Childers, 1992). When adding colour and light to a platform environment, it is vital that the density on the platform and the goal-orientedness of the passengers is taken into consideration. Only by carefully tailoring the correct colour with the right light intensity can a more positive station and waiting experience be achieved.

6.6 RECOMMENDATIONS FOR NS

In practice this means that in peak hours, when it is busy and there are relatively more must passengers at the station, cool colours should be used with a high light intensity. The cool colours afford visual calm and the high light intensity keeps people more on the alert and encourages the task-related getting on and off the train. In contrast, stimulating colours and a lower light intensity could be used in off-peak hours, when it is quieter and there are more lust passengers, in order to assuage any feeling of boredom. NS could consider varying the light intensity and coupling it to the arrival of a train. Passengers prefer less light whilst waiting for the train but when it comes in, they are alert. A temporary higher light intensity would ease the boarding process.

CHAPTER 7

MUSIC

‘TO STOP THE FLOW OF MUSIC WOULD BE LIKE THE STOPPING OF TIME ITSELF, INCREDIBLE AND INCONCEIVABLE.’

AARON COPLAND, 1900-1990

7.1 INTRODUCTION

Besides atmospheric influences such as colour and lighting, music has been acknowledged as one of the most important and effective elements in the servicescape. This is partly due to the fact that it is relatively inexpensive to deploy and easy to control and partly because music has been shown to positively impact a wide range of consumer responses in retail and service settings (e.g. Garlin & Owen, 2006), and more specifically in restaurants (Caldwell & Hibbert, 2002; Milliman, 1986; North, Shilcock & Hargreaves, 2003), banks (Dubé, Chebat & Morin, 1995; North, Hargreaves & McKendrick, 1999) and travel agencies (Bitner, 1990). As far as we know, no studies have been conducted to date on the effect of music at railway stations. Although a considerable number of studies have examined isolated effects of music, few have incorporated effects of other atmospheric cues or contextual variables such as situational and personal variables (but see for exceptions Eroglu, Machleit & Chebat, 2005; Massara, Liu & Melara, 2010; Mattila & Wirtz, 2001 and Michon, Chebat & Turley, 2005). Moreover, understanding the processes through which atmospherics interact to affect customer experiences is limited.

7.1.1 IMPACT OF MUSIC

Music is an intangible (*ambient*) environmental variable which is capable of evoking complex emotional, cognitive and physiological reactions (Grewe, Nagel, Kopiez & Altenmüller, 2007; Magnini & Parker, 2009; Tansik, & Routhieaux, 1996; Wirtz & Bateson, 1999). Bruner (1990) alleges that each piece of music has a physical dimension (volume, pitch, rhythm and tempo), an emotional tone (minor or major) and a preferential dimension (the degree to which the music is appreciated and known). Although music is composed of different components, it is perceived holistically, i.e. as a whole (e.g. Botschen & Growther, 2001; Holahan, 1982). It is not a prerequisite that music be consciously perceived (Dijksterhuis, Smith, Van Baaren & Wigboldus, 2005), and research shows that music can influence behaviour without consumers being aware of it (Milliman, 1982; Gulas & Schewe, 1994; North, Hargreaves & McKendrick, 1999).

Studies have revealed that music can produce a myriad of effects, depending on the manipulation and the context. Music influences the degree of arousal (Kent & Kellaris, 2001; Smith & Curnow, 1966; Sweeney & Wyber, 2002; Yalch & Spangenberg, 2000), the perception of crowding (Eroglu, Machleit & Chebat, 2005), the store image (Gulas & Schewe, 1994), the interaction between client and salesperson (Dubé, Chebat & Morin, 1995), the purchasing speed (Smith & Curnow, 1966), the purchasing and consumption behaviour (Areni & Kim, 1993; Lammers, 2003; Yalch & Spangenberg, 1990), the tendency towards impulse buying (Kellaris & Kent, 1991), the state of mind (Bruner, 1990) and the experience of time (Kellaris & Altsech, 1992; Kellaris & Kent, 1992). The impact of music can be mediated by music tempo (Milliman, 1982; 1986), music volume (Kellaris & Kent, 1992; Smith & Curnow,

1966), musical preference (Herrington & Capella, 1996), the use of background or foreground music (Yalch & Spangenberg, 1990; 1993; Areni & Kim, 1993) and by age (Gulas & Schewe, 1994; Yalch & Spangenberg, 1990).
The volume, tempo and genre of music can have a stimulating effect (*arousal*). Loud music stimulates more powerfully than soft, just as fast music does more than slow and techno more than classical. Various studies have shown that tempo induces the greatest physiological reactions in breathing, blood pressure and heartbeat (Kellaris & Kent, 1992). Music with a tempo below 50 BPM (beats per minute) even has a calming effect, because our body attunes itself, as it were, to the speed of the music. Besides this therapeutic effect of slow music on our body, research findings reveal that slow-tempo music induces greater positive reactions for satisfaction, relaxation and pleasure than more up-tempo music (Oakes, 2003).

7.1.2 MUSIC AND EMOTIONS

Whether a person wants (or does not want) to hear (a specific kind of) music, depends on one's goal, state of mind and personality (Stratton & Zalanowski, 2003). Extroverts, for example, seek more complex stimuli and are more receptive to intricate music. On listening to music, extroverts experience greater pleasure and achieve better than introverts (Furnham & Allas, 1999). According to Kellaris and Kent (1994), classical music initiates more pleasure and pop music more arousal. Positively valued music evokes a more positive emotional response and stronger approach behaviour towards the service organization (Hui, Dubé & Chebat, 1997; Lindstrom, 2005; Sweeney & Wyber, 2002). Music is not just stimulating but it can also evoke associations and appeal to certain target groups (Herrington & Capella, 1996). The positively associative effect of music appears from a research in which consumers in a supermarket bought German wines when they heard German music and French wines when they heard French music, without their being aware of German or French music being played (North, Hargreaves & McKendrick, 1999). Similarly, with classicial music in the background, consumers in a wine shop also tended to buy the more expensive wines (Areni & Kim, 1993), and in a cafetaria were even prepared to pay more (North & Hargreaves, 1998).
Music can also evoke negative emotions. If at a given time an individual has no desire for music, e.g. when one has to perform a (complex) task, the presence of music will be experienced as annoying and will induce stress (Kaltcheva & Weitz, 2006; Massara, Liu & Melara, 2010). Also in combination with density can music lead to more stress. The (negative) effects of too much density can be compensated by 'low arousal' stimuli (Baker & Cameron, 1996; Eroglu, Machleit & Chebat, 2005). Creating a quiet zone during busy moments may well decrease the stress caused by crowding. When someone has the choice whether or not to listen to music, the sense of personal control increases and feelings of stress can be avoided or weakened.

7.1.3 MUSIC TEMPO, MUSICAL GENRE AND WAITING TIME

Positive or negative affective reactions of consumers to music can influence the subjective waiting time and length of stay (Caldwell & Hibbert, 2002). On the basis of a literature study, Baker and Cameron (1996) posited that music which creates a positive affect among consumers results in the waiting time in a service environment as appearing to be less long (Chapter 4). Various studies have shown that music tempo has contradictory effects on the estimation of the waiting time (Oakes, 2000; 2003). With slow music, for example, people spend a longer period in a restaurant (Caldwell & Hibbert, 1999; Milliman, 1982; 1986), but fast music results in an overestimation of the waiting time (Kellaris & Mantel, 1996; Oakes, 2003). Smith and Curnow found that a high volume effected a shorter length of stay in a supermarket (Smith & Curnow, 1966), just as Kellaris and Altsech found that a higher volume led to a longer time estimation (Kellaris & Altsech, 1992; Kellaris, Mantel & Altsech, 1996). Cameron, Baker, Peterson and Braunsberger (2001) determined that music influences the perception of the waiting time and mood.

Sometimes no relationship is found at all between music and waiting time. Areni and Kim (1993), for example, found no differences for length of stay with classical music compared with the Top 40, just as Herrington and Capella (1996) found no relationship between music tempo and volume and the objective length of stay in a supermarket. They did, however, determine that consumers stayed in a supermarket longer when music was played that they liked. Pleasant music (*major key*) can lead to a longer waiting time perception (Kellaris & Kent, 1992), but familiar music in a waiting situation can shorten the time perception (Baily & Areni, 2006). According to Hui, Dubé and Chebat (1997), the style of music does not influence the time perception but it does initiate a more positive mood and more positive emotions.

The studies give the impression that the attention is focused on familiar music and music in a major key or with a higher volume (Baker & Cameron, 1996; Kellaris & Kent, 1992; Yalch & Spangenberg, 1990; 2000). One explanation might be that music that draws attention is remembered better and that in retrospect more would seem to have happened with as a result that the perceived time seems longer. That would mean that the *storage size* (Ornstein, 1969) or *segmentation model* (Homa & Poynter, 1983) is applicable. However, a station environment differs from a retail environment in a number of ways. At a station, passengers keep a close eye on the time because they have a train to catch. Music might then distract passengers from the time which, according to Zakay and Block's *attentional model* (1997, Chapter 3), could lead to their assessing the wait as shorter.

Music in relation to the waiting situation

Reversal theory (Apter, 2007) alleges that the context is important for the number of stimuli that people appreciate (Chapter 4). In a busy environment and with a goal-oriented task, people are less receptive to extra stimuli than in a quiet environment and when they have no task at hand. We expect music to distract passengers from

the waiting time and that they will experience the (kind of) music differently at busy or quiet moments.
To test these predictions, we conducted two field studies and one experimental study in a virtual station in which the effects of music were tested during peak and off-peak hours. Study 1 addresses the effect of music on perceived control under variable conditions of density. Study 2 explores how to make informed choices on the type or kind of music employed and investigates the relationship between density, music tempo and station evaluation. By means of an online experiment, the third study examines what influence stimulating and calming musical genres have on the waiting experience. Besides density, the motivational orientation (must/lust) were included as moderating variables.

7.2 STUDY 1 THE ROLE OF PERCEIVED CONTROL IN THE RELATION BETWEEN HUMAN DENSITY AND BACKGROUND MUSIC IN A RAILWAY STATION: A FIELD EXPERIMENT

7.2.1 INTRODUCTION

Although the potential positive effects of background music have been firmly established, recent findings indicate that effects of music should not be studied in isolation but rather in its interplay with other atmospheric variables (Eroglu, Machleit & Chebat 2005; Matilla & Wirtz, 2001; Oakes & North, 2008).
However, research addressing combined effects of atmospheric variables is scarce and insights into the underlying processes through which atmospherics affect consumer behaviour are limited. Of particular interest for the present purpose is the finding that music may aggravate or alleviate effects of an important variable that is particularly hard to control: aversive density conditions resulting from too few or too many customers in the service environment (Eroglu, Machleit & Chebat, 2005). Since perceptions of crowding are an important determinant of service evaluation (e.g. Hui & Bateson, 1991), service managers are advised to mitigate negative effects of density conditions as much as possible.
Departing from the given that railway stations by definition are settings with large fluctuations in density, the degree to which music can attenuate negative consequences of density will be explored. In considering the consequences of density on consumer response, perceived control, i.e. the extent to which people can realize their goals in a specific situation, has been shown to be a key variable of interest (Dion, 2004; Hui & Bateson, 1991; Van Rompay, Galetzka, Pruyn & Moreno-Garcia, 2008).
In railway stations, two types of goals may be distinguished. It is of paramount importance to travellers to arrive at the station on time and to find their way to the platform within a span of a few minutes. Such goals may be considered functional insofar as they relate to practical activities aimed at securing the service offer (i.e.

catching the right train at the right time). However, practical goal achievement may not always claim top priority. For instance, during extended waits or delays, goals related to wayfinding and time management may have already been met. Likewise, during off-peak hours (i.e. when density is low), stations allow for easy wayfinding since access to information displays, information messages and platforms is unobstructed. In other words, under these circumstances, practical goals may recede to the background either because they have already been met or because goal attainment poses no difficulties. In consequence, customers may be more attuned to distractions and entertainment that allow for a pleasant platform experience. Taking note of these considerations, the two-sided function of music becomes apparent. More specifically, it is argued that music may decrease feelings of control by interfering with customers' needs to stay alert and tuned to information messages and the sounds of approaching trains (i.e. by thwarting practical goal achievement). Alternatively, however, it is argued that music may increase feelings of control and the hedonic tone (Apter, 2007) during off-peak hours when functional goal achievement is less demanding and experience-related goals come into play. It is then that music may facilitate (experiential) goal achievement by being a welcome source of distraction or entertainment.

7.2.2 DENSITY AND PERCEIVED CONTROL

Of all environmental factors, human density, i.e. reflecting the number of customers in the service setting, is, for obvious reasons, the most difficult to control. Density is generally conceptualized as a stressful experience (Cozby, 1973; Eroglu, Machleit & Barr, 2005; Hui & Bateson, 1991; Machleit, Eroglu & Mantel, 2000), and is considered the primary determinant of crowding perceptions (Stokols, 1972). In addition, highly crowded environments have been found to evoke higher levels of negative emotions while shopping (Machleit et al., 2000), and decreased shopping satisfaction (Machleit, Kellaris & Eroglu, 1994). Naturally, effects of density may vary with personality (Van Rompay, Galetzka, Pruyn & Moreno-Garcia, 2008), culture (Pons & Laroche, 2007; Pons, Laroche & Mourali, 2006), shopping intentions (Eroglu, Machleit & Barr, 2005), and the architectural space (Evans, Lepore & Schroeder, 1996).
Explanations of density effects usually stress the role of perceived control (Dion, 2004; Hui & Bateson, 1991; Langer & Saegart, 1977; Van Rompay et al., 2008), in general terms defined as the need to be master over one's environment (White, 1959). In more practical terms, perceived control has been conceptualized in terms of goal achievement (cf. Ward & Barnes, 2001); environmental factors obstructing goal achievement reduce feelings of control whereas factors facilitating goal achievement increase feelings of control. High density may decrease perceptions of control by, for example, reducing privacy or hindering free movement through the environment. Hui and Bateson (1991), for instance, demonstrated that density negatively affects perceptions of control in a bank setting, thereby reducing experienced pleasure and, in turn, approach behaviours.

7.2.3 FORMULATION OF HYPOTHESES

In considering the relation between music and perceived control for a railway station, it could be argued that under conditions of high density, the presence of music negatively influences customer experience insofar as it aggravates the negative effects of high density on perceived control. After all, when perceived control is already low due to high density, the presence of music may further aggravate these effects by being an additional hindrance to, for instance, clear reception of information messages. At the same time, however, customers may positively value music when density is low, since finding one's way and staying tuned to information messages is less of a problem. In other words, under these circumstances, the primary goal of being at the right place on time has been met and secondary goals come into play. Although high levels of density and music may be considered 'too much', situations involving low levels of density and no music may be characterized as boring. In such low density situations, perceptions of control are positively affected by music because it provides a welcome distraction or source of entertainment.

Based on the foregoing, we predict that:

H1: *In a high-density service environment, the presence of background music, as opposed to the absence thereof, thwarts practical goal fulfilment (i.e. decreases control), in turn negatively affecting station evaluation.*

H2: *In a low-density service environment, the presence of background music, as opposed to the absence thereof, facilitates experiential goal fulfilment (i.e. increases control), in turn positively affecting station evaluation.*

By implication, evaluations are expected to be the most positive in situations where density is low and music is playing, and, conversely, in situations where density is high and music is absent.

7.2.4 METHOD

A 2 (no music vs music) x 2 (density: off-peak hours vs peak hours) between-subjects design in a field setting was employed to test the hypotheses. The study was conducted at a large railway station in the Netherlands. Background music was played at a moderate volume level over the course of the study.

Participants

A total of 88 passengers (52% male, 48% female; mean age 35; range 18-80 years) participated in this field experiment. On the platform, passengers were randomly approached by a researcher who asked them to fill in a questionnaire on the ambience of the railway station. The respondents were given the opportunity to finish and (anonymously) hand in the questionnaire during their train journey. Ultimately, the music condition included 24 participants during peak hours and 18 participants during off-peak hours. The no music condition included 26 participants during peak hours and 20 participants during off-peak hours.

Experimental Procedures

The study was conducted on four consecutive weekdays (Tuesday-Friday). Background music was played on the platform during peak and off-peak hours. On Tuesday and Wednesday no music was played. Music (a mix of Eurocharts' international hits) was played on Thursday and Friday (from 06:30-23:59hrs). Taking into account that stations are much more crowded during peak than off-peak hours, density conditions (low versus high) were set depending on the time of day (peak hours vs off-peak hours).

Measures

– *Manipulation Check.* We used peak and off-peak hours to manipulate density. Since people may vary in the extent to which they perceive a dense condition as crowded (Stokols, 1972), a measure of perceived crowding was used (cf. Hui & Bateson, 1991). Perceived density was measured with the item "This station is crowded" (*1 = totally disagree, 7 = totally agree)*.
– *Dominance*. Perceived control was measured with three items (Russell & Mehrabian, 1977): "I felt in control at the station", "At the station I could find what I was looking for" and "I felt unrestricted at the station" (*1 = not at all, 7 = totally;* Coefficient Alpha = .75).
– *Station Evaluation*. Station evaluation was measured with three items: "At this station I enjoy travelling by train", "I enjoy being at/travelling to and from this station" and "I would recommend others to travel from and to this station" (*1 = not at all, 7 = totally*; Coefficient Alpha = .75).
– *Relaxed wait.* Two questions also measured whether the wait at the station was found to be relaxing: "I found the wait at the station comfortable" and "I was calm and relaxed at the station" (*1 = not at all, 7 = totally*; $r = 0{,}50$).

Finally, demographics and travel frequency were recorded.

7.2.5 RESULTS STUDY 1

Manipulation check

We conducted an analysis of variance to test the density manipulation. The respondents in the peak hour condition rated the station as more crowded ($M = 4.9$, $SD = 1.37$) than the respondents in the off-peak condition ($M = 3.9$, $SD = 1.85$, $F(1, 82) = 7.75$, $p < .01$), indicating that the density manipulation was successful.

Test of hypotheses

The interactive effects of background music and density on customer responses (perceived control and station evaluation) were explored by means of a multivariate analysis of variance (MANOVA). Results showed a significant interaction between the conditions ($F(3, 75) = 7.23$, $p < .001$). The main effects for density ($F(3, 75) = 1.12$, *ns*) and music ($F(3,75) = 1.02$, *ns*) did not reach significance.

Univariate analyses of variance (ANOVAs) were conducted to test the hypothesized interaction effects between music and density on perceived control, station evaluation and relaxed wait. Results showed significant interaction effects on perceived control ($F(1, 79) = 14.72$, $p < .001$), station evaluation ($F(1, 77) = 5.29$, $p < .03$), and relaxed wait ($F(1, 77) = 11.98$, $p < .001$)[6].

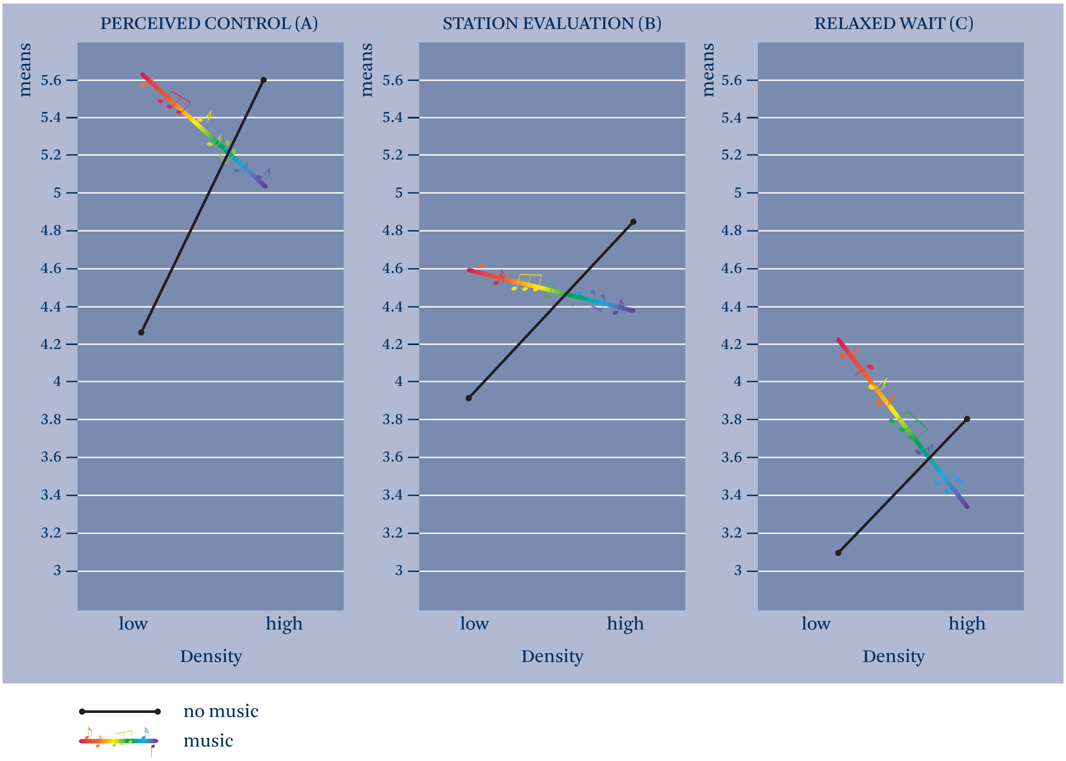


Figure 7.1 Perceived control (A), station evaluation (B) and relaxed wait (C) as a function of density and background music

6 Because it is possible that commuters travel from the station 5 days a week, their opinion might be influenced by previous station experiences. Therefore, we conducted a 2 x 2 ANCOVA on station evaluation with station experience as covariate. The reported results remained significant when controlled for station experience.

As can be seen in Figure 7.1, when density is low, background music positively affects perceived control ($F(1, 79) = 12{,}81$, $p < .001$), station evaluation ($F(1, 77) = 3.21$, $p < .08$) and relaxed wait ($F(1, 77) = 10{,}26$, $p = .002$). Under conditions of high density, the effects of background music (although pointing in the predicted direction) did not reach significance ($F(1, 79) = 2.95$, *ns* for perceived control, ($F(1, 77) = 2.08$, *ns* for station evaluation and ($F(1, 77) = 2.49$, *ns* for relaxed wait).

In sum, these results partly confirm our predictions by indicating that under conditions of low density, the presence of music resulted in higher perceived control, more positive station evaluation and relaxed wait.

Hypotheses 1a and 1b state that the interaction effect of music and density on station evaluation is mediated by perceived control. For this type of mediation to apply, the relation between perceived control and station evaluation should be significant, as was confirmed by a correlation analysis ($r = .33$, $p < .01$). In addition, the observed interaction between density and music on station evaluation should become non-significant when perceived control is included in the analysis with density and music as independent variables and station evaluation as dependent variable. Finally, the effect of the mediator (perceived control) on the dependent variable (station evaluation) should remain significant. To complete the requirements for mediation perceived control was included as a covariate in the 2×2 ANCOVA for station evaluation. In line with the requirements for mediation, the interaction between density and music became non-significant ($F(1, 76) = 1.84$, *ns*), whereas the effect of the mediator (perceived control) on the dependent variable (station evaluation) remained significant ($F(1, 76) = 4.70$, $p = .03$). The results indicate that, as expected, the interactive effect of background music and density on station evaluation is mediated by perceived control.

7.2.6 DISCUSSION STUDY 1

The findings from study 1 demonstrate that music can be used to counteract negative effects of low density. In line with predictions, it was shown that music may best be used in low-density conditions, i.e. during off-peak hours. These findings reveal a prime mechanism through which music and density conjointly affect the experience of the service setting under discussion. In line with previous research (e.g. Dion, 2004; Hui & Bateson, 1991; Van Rompay et al., 2008), music and density were shown to impact feelings of perceived control (i.e. extent of goal fulfilment), and, hence, to conjointly shape the station experience. However, whereas in previous research atmospherics were mostly studied in isolation (Eroglu, Machleit & Chebat, 2005), the findings presented contribute to existing literature by incorporating the interactive effects of two important atmospheric variables *and* by focusing on the mediating process. With respect to the mediating process outlined, future research should establish whether music and density affect customers' sense of control via different routes. For instance, it could be argued that music primarily affects auditory control, whereas density affects visual control. Nonetheless such fluctuations in different types of control may ultimately transpire in a general feeling of being in or out of control. We will come back to this in Chapter 9.

7.3 STUDY 2 INFLUENCE OF MUSIC TEMPO IN A BUSY AND QUIET PLATFORM ENVIRONMENT

7.3.1 INTRODUCTION

The results from study 1 indicate that music can be used to counteract negative effects of low or high density. In line with predictions, it was shown that music may best be used in low-density conditions, i.e. during off-peak hours. However, these results are not very informative when it comes to the choice of music. As discussed, musical selections may vary on many dimensions, genre and tempo being the most obvious.

7.3.2 FORMULATION OF HYPOTHESES

Interestingly, music tempo has received considerable research attention (e.g. Eroglu, Machleit & Chebat, 2005b; McElrea & Standing, 1992; Milliman, 1982; 1986; Oakes, 2003). On the basis of a literature review, Oakes and North (2008) concluded that congruency of music together with other environmental stimuli determines the finding of either positive or negative effects. Of particular importance for the present context is a study by Eroglu, Machleit & Chebat (2005) that showed that slow-tempo music in a retail setting positively affected hedonic and utilitarian evaluations under conditions of high density, whereas up-tempo music had positive effects under conditions of low density (Eroglu, Machleit & Chebat, 2005). An explanation for these results holds that under moderate incongruity (arising from *low* density and *up*-tempo music or vice versa), consumers' evaluations are the most positive. Also optimal arousal theory offers an explanation: in a quiet environment with quiet music, too few stimuli are perceived, whereby the pleasure to remain in that environment diminishes (Apter, 2007; Hebb, 1955). In service marketing literature, no studies have been reported that address the interaction of these two factors. Based on these findings, it is expected that:

***H1:** In a high-density service environment, slow- as opposed to up-tempo music positively affects station evaluation.*

***H2:** In a low-density service environment, up- as opposed to slow-tempo music positively affects station evaluation.*

7.3.3 METHOD

A 2 (music: slow- vs up-tempo music) x 2 (density: off-peak hours vs peak hours) between-subjects design in a field setting was employed to test the hypotheses presented. Background music was played at a Dutch railway station at a moderate volume level over the course of four consecutive days.

Participants

A total of 104 passengers (59 male and 44 female; mean age 33; range 17-70 years) participated in this field experiment. Again, passengers were randomly asked to fill in a questionnaire on station ambience in the train after it left the station.

Experimental Procedures

Music was played all day (from 06:30-23:59hrs) on four weekdays at the railway station. On Friday and Monday slow music was played ('easy listening' pop songs at minus 72 BPM), and on Tuesday and Wednesday up-tempo music was played (hits, over 94 BPM).

As in study 1, the density manipulation was effected by variations in the time of day that the questionnaires were distributed, filled in and collected. Again, the measurement periods were categorized as either peak hours (16:00–18:00hrs) or off-peak hours (21:00-23:59hrs).

Dependent Measures

For methodological reasons, the first two field experiments were carried out with a minimal number of questions so that the time between the confrontation with the stimulus and the moment of measurement (in the train) would remain as short as possible. For this reason, choices had to be made on the number of questions.

- *Manipulation check*. Perceived density was measured with the item "This station is crowded" (*1 = totally disagree, 7 = totally agree)*.
- *Relaxed wait.* This variable specified how the experimental subjects perceived the environmental stimuli and whether they felt comfortable at the station: "I was calm and relaxed at the station" (*1 = totally disagree, 7 = totally agree*).
- *Station evaluation*. This was determined by asking participants to evaluate the station by awarding a score on a 10-point scale *(1 = very poor, 10 = excellent).*
- *Service evaluation.* As an organization, NS is interested to find out whether music influences the perception of the service evaluation. This two-item variable thus specified how the experimental subjects experienced the service of NS: "I find the level of service at this station good" and "The service staff seem quite friendly" (*1 = totally disagree, 7 = totally agree; r = .58)*.

7.3.4 RESULTS STUDY 2

The manipulation check confirmed that during peak hours, the station was rated as much more crowded ($M = 3.8$, $SD = .91$) compared with off-peak hours ($M = 2.7$, $SD = 1.12$; $F\,(1, 101) = 26.94$, $p < .001$).

It was predicted that in a high-density environment, slow- as opposed to up-tempo music would positively influence customer evaluations, and vice versa. To test these hypotheses, first a MANOVA explored the effect of density and music tempo on the dependent variables and revealed a significant interaction that supported our predic-

tions ($F(3, 95) = 8.16$, $p = .000$). Next, univariate 2 (slow-tempo vs up-tempo music) x 2 (low density vs high density) ANOVAs were performed for each dependent variable. First we saw for relaxed wait an effect for the interaction between music and density ($F(1, 97) = 6.15$, $p = .015$). In a busy environment waiting was more relaxing with slow- than up-tempo music ($F(1, 97) = 3.80$, $p < .05$). For quiet periods this difference was non-significant ($F(1, 97) = 2.51$, *ns*, Figure 7.2A).
For station evaluation, the results also yielded a significant effect for the interaction between music and density ($F(1, 97) = 4.05$, $p < .05$). In a high density environment, up-tempo music resulted in a less positive station evaluation whereas slow-tempo music positively impacted station evaluation ($F(1, 97) = 4.89$, $p < .03$). In the low density environment, however, the difference between the music conditions was non-significant ($F < 1$, ns, Figure 7.2B).
Finally, we also conducted an ANOVA for service evaluation and saw a similar interaction effect ($F(1, 100) = 20.44$, $p = .000$). In a quiet environment, the service was positively rated with up-tempo music ($F(1, 100) = 11.39$, $p = .001$), just as the service was positively rated in a busy environment with slow-tempo music ($F(1, 100) = 8.51$, $p = .004$, Figure 7.2C).

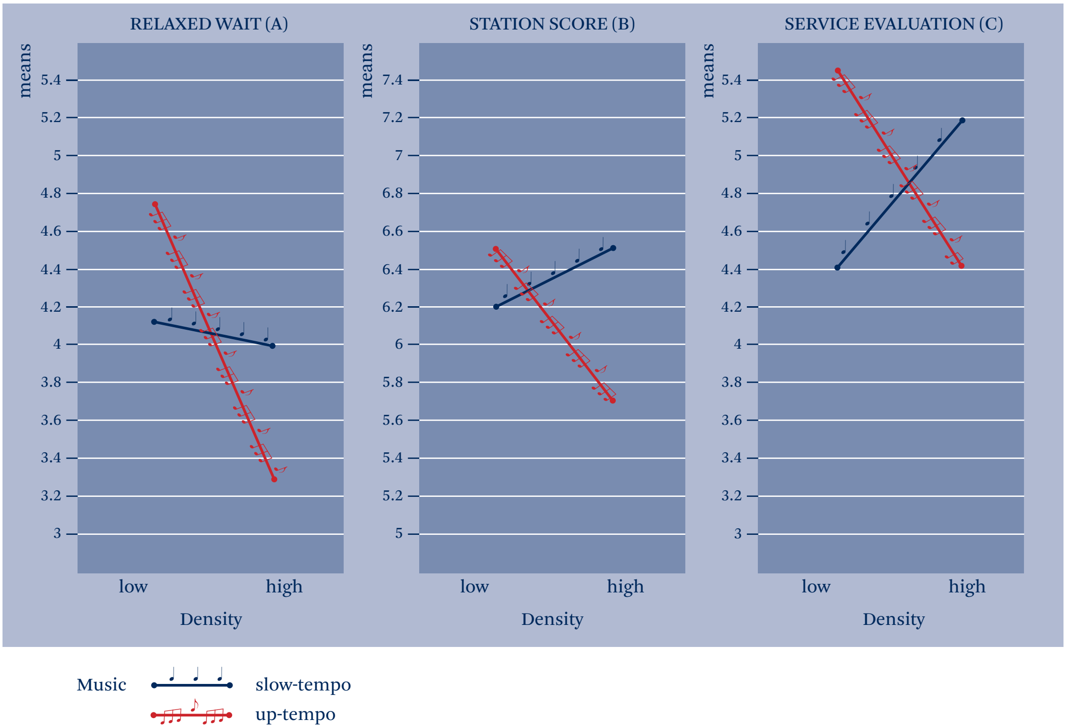


Figure 7.2 Relaxed wait (A), Station score (B) and Service evaluation (C) as a function of density and background music

This pattern of results confirms hypothesis 1 that predicted that in a high-density environment, slow- as opposed to up-tempo music positively influences customer evaluations. The results indeed partly support the prediction that in a low-density environment, up- as opposed to slow-tempo music positively influences customer evaluations. Also for the service evaluation hypothesis 2 is confirmed but, despite the interactions pointing in the right direction, these are not significant for station evaluation and relaxed wait.

7.3.5 DISCUSSION STUDY 2

Findings from study 2 demonstrated the importance of music choice, indicating that music tempo is a variable of key interest with respect to managing density conditions. In addition, arousal should be addressed in order to further explore the effects of music tempo under various conditions of density. Apart from perceived control, the findings from study 2 suggest that music and density might also influence arousal levels, as also suggested in or evidenced by previous research (Caldwell & Hibbert, 2002; Eroglu, Machleit & Chebat, 2005). With respect to music, the findings demonstrate that music is a multidimensional factor that has different effects depending on, among other things, context (e.g. density conditions), and type of manipulation (e.g. absence or presence, tempo). Naturally, variables such as volume and genre are also likely to codetermine the effects of music on perceived control, and, in turn, on the 'waiting' experience. For instance, regardless of tempo, preferences with regard to genre are likely to codetermine the effects of music. It is for that reason, that mainstream, easy listening music was used in these studies. Interestingly, music tempo has received considerable research attention (e.g. Eroglu, Machleit & Chebat, 2005; McElrea & Standing, 1992; Milliman, 1982, 1986; Oakes, 2003). Of particular importance for the present context is a study by Eroglu, Machleit & Chebat (2005), which showed that slow-tempo music in a retail setting positively affected hedonic and utilitarian evaluations under conditions of high density, whereas up-tempo music had positive effects under conditions of low density. An explanation for these results holds that under moderate incongruity (arising from *low* density and *up*-tempo music or vice versa), consumers' evaluations are the most positive (Eroglu, Machleit & Chebat, 2005). The results concur with reversal theory, which suggests that travellers in a busy environment have no desire for stimulation and thus prefer no or only slow-tempo music, as opposed to their embracing many stimuli and also up-tempo music in a quiet environment.
Regardless of characteristics, such as tempo and volume, preferences with regard to genre are likely to codetermine the effects of music. Lacking specific information concerning customers' musical preferences, service managers are advised to avoid such styles as modern jazz or heavy metal, which can be expected to elicit a less uniform response. Clearly, follow-up research should incorporate variations in musical characteristics to address both these and related issues. Further studies could address the importance of perceived control in other types of service settings.

For instance, to what extent do perceptions of goal fulfilment mediate environmental effects in a hedonic or leisure environment? Although explicit or implicit goals are at the basis of service encounters in general, the extent to which perceptions of goal fulfilment are central to overall satisfaction and attitude formation may vary across services. Arguably, control perceptions are particularly influential in services which demand task-oriented actions (i.e. locating and walking to the right platform or locating and collecting products in a retail environment) from customers in order for service delivery to succeed.

7.4 STUDY 3 INFLUENCE OF MUSICAL GENRE ON STATION AND TIME EXPERIENCE AT A VIRTUAL STATION[7]

7.4.1 INTRODUCTION AND THEORETICAL BACKGROUND

In the first two studies we demonstrated that music in a quiet environment has an extra stimulating effect and results in more positive emotions and evaluations. In the second study, with the tempo of the music as the key variable, it appeared that a more positive station evaluation resulted from up-tempo music being played in a quiet environment. In this third study we will examine whether musical genre can also influence the station and waiting experience.

7.4.2 RESEARCH PURPOSE

This study investigates whether music can influence the station and waiting experience by comparing two different genres with one another: calming and stimulating music. The pieces of music were selected after conducting two preliminary studies. The first had to ascertain which musical genre was appreciated by passengers at a station, and the second was conducted with a music expert first to select various calming and stimulating pieces of music and subsequently to ascertain whether passengers did indeed experience these as calming and/or stimulating (Appendix 2).

Research questions and hypotheses

According to Apter's reversal theory (2007), the preference for the level of stimuli is moment-dependent. In off-peak hours the stations are often deserted. When it is quiet, passengers experience few environmental stimuli and this can lead to boredom. Playing stimulating music on a quiet platform affords extra stimuli which passengers might rate positively. At rush hour, on the other hand, stations are extremely busy. Crowding is an environmental factor that influences evaluations and behaviour. In a crowded situation, passengers already experience sufficient

7 This study was presented at the European Transport Conference (Van Hagen, Pruyn, Galetzka & Sauren, 2010).

stimuli and to add to this in the form of stimulating music would result in an overstimulation whereby the hedonic tone decreases. As we expect passengers in a crowded situation to rate calming music more positively than stimulating music, we thus formulated the following hypotheses:

***H1:** Stimulating music in a quiet environment affords a more positive waiting experience and station evaluation as opposed to calming music.*

***H2:** Calming music in a crowded environment affords a more positive waiting experience and station evaluation as opposed to stimulating music.*

NS has to cater for passengers with divergent travel motives who differ in goal-orientedness, the so-called must and lust passengers. Reversal theory also makes a distinction in goal-orientedness, and refers to the terms *telic* and *paratelic state*. In the *telic state* consumers are serious and goal-oriented and have little need of extra stimuli. In the *paratelic state* consumers are more spontaneous and less bent on things going according to plan and thus they appreciate extra stimuli. Must passengers are cognitively engaged in the processing of information and keep their eye on the clock. They are also expected to be less receptive to stimuli and aspire more to peace and quiet. In comparison, lust passengers are less goal-directed, are not in a hurry and are expected to be more receptive to enviromental stimuli. This resulted in the following hypotheses:

***H3:** Must passengers rate the waiting experience and station more positively with calming music than with stimulating music.*

***H4:** Lust passengers rate the waiting experience and station more positively with stimulating music than with calming music.*

Not only does music create extra environmental stimuli but it can also offer distraction from waiting. The attentional model (Zakay & Block, 1997) poses that people pay less attention to the time when they are occupied in a non-time-bound activity, such as listening to music, and that the wait therefore seems to be shorter. Passengers pay less attention to the time when they are distracted and are thus less capable of estimating how long they have waited (Chapter 3). We did not expect any difference in time estimations for must passengers, because they are totally focused on the travel process and do not allow themselves to be distracted (Appendix 4). We did expect, however, that lust passengers would estimate the wait as being shorter. On the basis of reversal theory it can be expected that it is indeed stimulating music that stimulates the waiting lust passenger more and that this will lead to a positive affective reaction. By giving passengers a more positive feeling, the wait will be experienced as less boring (Chebat et al., 1995; Gardner, 1985; Mayer, Gaschke, Braverman, & Evans, 1992; Pruyn & Smidts, 1998) and lead to a shorter time perception (Baker & Cameron, 1996; Hornik, 1984; 1992). With regard to waiting time perception, the following is expected:

***H5:** In a quiet environment, lust passengers experience a shorter perceived waiting time with stimulating as opposed to calming music.*

7.4.3 METHOD

Experimental subjects and design
For this study we approached members of the NS customer panel, i.e. passengers who have agreed to participate in studies conducted by NS (Appendix 1). The online assignment and questionnaire was fully completed by 517 members of the panel (58.9% male, 41.4% female). The mean age of the panel members was 43 years (SD = 15,73). In a 3 (musical genre: stimulating vs calming vs no music) x 2 (passenger type: must vs lust) x 2 (density: busy vs quiet) between-subjects design we studied what influence the differences in musical genre have on the passenger's waiting and station experience.

Procedure
The effects of the musical genre were measured by having the experimental subjects carry out an assignment in a virtual reality station of Leiden Central. Subjects were asked to take the first train to Amsterdam, whereby half of them had to imagine themselves in the goal-directed 'must scenario' and the other half in the hedonic 'lust scenario' (*Introduction to the experimental studies*). Half of the subjects were in a station with few passengers, the other half in a station with many. Before the subjects entered the virtual world, they were expressly requested to adjust the sound on their computer (to a comfortable volume), the reason being that they would be hearing announcements. The music was played at a lower volume than the announcements. Half of the subjects could listen to calming tracks, whereas the other half were allocated stimulating pieces of music. The six tracks per genre were played at random (Appendix 3). As subjects entered the virtual world at an arbitrary moment, their objective waiting time differed. The objective waiting time at the station and on the platform was recorded. After completing the assignment, subjects filled in a questionnaire that addressed the experience of both the wait and the station as well as their appreciation of the music.

Measurements
The variables (with the exception of the time, the score and the appreciation of the music) were measured with a 7-point Likert scale whereby 1 was 'totally disagree' and 7 was 'totally agree'. Table 7.1 shows the Cronbach's Alphas, the minimum and

maximum values, the mean and standard deviations of the constructs. The station experience was measured with the following variables:

- *Pleasure:* For the PAD emotions an adapted scale of Mehrabian and Russell (1974) was used. Pleasure was measured with six bipolar items (unhappy-happy, annoyed-pleased, melancholic-contented, unsatisfied-satisfied, despairing-hopeful, unpleasant-pleasant).
- *Arousal* was measured with 6 items (relaxed-stimulated, calm-excited, jittery-dull, wide awake-sleepy, sluggish-frenzied, unaroused-aroused).
- *Dominance* was measured with four items (influenced-influential, cared for-in control, guided-autonomous, submissive-dominant).
- *Station score:* experimental subjects gave a score for their opinion on the quality of the station (*1 = very poor, 10 = excellent*).

The waiting experience was measured with the following variables:

- *Time perception:* How the time on the platform was experienced was measured with the open question: "If you had to guess, how long do you think you were at the platform (in minutes)?" The *cognitive evaluation of the waiting time* (long/short) was measured with the question: "How did you experience the time spent at the station?" (1 = *very short*, 7 = *very long*).
- *Acceptation of the waiting time:* This was measured with the question: "I found the waiting time on the platform: acceptable – unacceptable."
- *Utilitarian and hedonic waiting time:* The utilitarian waiting time (did one spend the time usefully, measured with five items) and the hedonic waiting time (did one spend the time pleasantly, measured with three items) were measured for the waiting time on the platform by using items of the Shopping Values of Batra and Ahtola (1991). Example utilitarian waiting time: "Was the time you spent waiting on the platform: useful–useless, valuable–worthless, etc." Example hedonic waiting time: "Was the time you spent waiting on the platform: pleasing–annoying, happy–sad, etc."

The appreciation of the music was determined by the (seven answers to the) following question: "What did you think of the music?": unpleasant-pleasant; unfitting-fitting; annoying-not annoying; cheerless-cheerful; sleep-inducing-stimulating; stress-enhancing-calming; meaningless-impressive ($\alpha = .89$). The end of the questionnaire enquired after demographics and whether the experimental subjects had heard music at the station.

Table 7.1 Cronbach's Alpha, Min., Max., M and SD of the dependent variables

	α	***Min.***	***Max.***	***M***	***SD***
STATION EXPERIENCE					
Pleasure	.89	1	7	4.38	.90
Arousal	.81	1	6	3.53	.88
Dominance	.80	1	7	3.93	.77
Score station	–	1	10	7.16	1.23
WAITING EXPERIENCE					
Time perception	–	0	20	3:50	3:00
Acceptance waiting time	–	1	7	4.86	1.36
Utilitarian waiting experience	.93	1	7	3.05	1.41
Hedonic waiting experience	.93	1	7	3.94	1.23

7.4.4 RESULTS

Manipulation checks

Of the 517 experimental subjects, 426 (82.4%) were in a condition with music. The other 91 subjects (17.6%) were in a condition without music. Of the 426 subjects in a condition with music, 298 of them (57.6%) reported they had heard music.

To determine whether the quiet versus busy platform was indeed experienced as either, a manipulation check was conducted. Three items of the perceived crowding scale (Harrell, Hutt & Anderson, 1980) were incorporated in the questionnaire in order to ascertain the perceived density ($\alpha = .79$). For example: "There are many passengers on the platform." An analysis of variance showed that experimental subjects in the crowded condition indeed assessed the platform as more busy ($M = 3.02$, $SD = 1.38$) than subjects in the quiet condition ($M = 2.22$, $SD = 1.18$, $F(1, 499) = 48.25$, $p = .000$).

Also a manipulation check was carried out to ascertain whether stimulating music was indeed assessed as being more stimulating than calming music. An analysis of variance showed that stimulating music was indeed experienced as being more stimulating ($M = 4.54$, $SD = 1.19$) than calming music ($M = 3.93$, $SD = 1.49$, $F(1, 208) = 11.02$, $p = .001$).

MANOVA station experience and waiting experience

A 3 (musical genre: stimulating vs calming vs no music) x 2 (density: busy vs quiet) x 2 (passenger type: must vs lust) MANOVA was conducted with the dependent variables relating to station experience (pleasure, arousal, dominance and score station) and to the waiting experience (utilitarian and hedonic assessment of waiting time, acceptable waiting time, cognitive waiting experience and waiting perception). The result of both MANOVAs can be found in Table 7.2.

Table 7.2 MANOVA (Wilks' Lambda) for variables stations and waiting experience

	Variables stations			Variables waiting experience		
	F	*df*	*p*	*F*	*df*	*p*
Music	1.77	8, 670	*.08*	<1	12, 638	
Density	1.38	4, 335	*ns*	1.54	6, 319	*ns*
Passenger type	<1	4, 335		<1	6, 319	
Music * density	3.72	8, 670	**.00**	1.34	12, 638	*ns*
Music * passenger type	<1	8, 670		1,72	12, 638	**.06**
Density * passenger type	<1	4, 335		1.36	6, 319	*ns*
Music * density * passenger type	<1	8, 670		1.79	12, 638	**.05**

Station experience

For the station assessment, interactions between musical genre and density were found on pleasure, arousal and the station score. Table 7.3 shows the averages and standard deviations.

For the waiting experience, interactions between music and passenger type were found on the waiting time perception and the acceptance of the wait, and a three-way interaction was found between density, music and passenger type on the hedonic waiting time. The interactions will now be discussed and visualized with interaction plots.

Table 7.3 Means(SDs) between musical genres and density on station experience

		No music	Calming music	Stimulating music
		M (SD)	*M (SD)*	*M (SD)*
Pleasure	Low density	4.49 (.72)^{a}	4.15 (.86)^{ab}	4.58 (.83)^{b}
	High density	4.55 (.90)^{a}	4.55 (1.01)^{b}	4.01 (.93)^{ab}
Arousal	Low density	3.60 (.84)	3.59 (.89)	3.47 (.75)
	High density	3.28 (.85)^{a}	3.30 (.95)^{b}	3.84 (.94)^{ab}
Dominance	Low density	3.90 (.71)	3.82 (.63)	3.97 (.80)
	High density	4.21 (.88)	4.01 (.80)	3.79 (.84)
Station score	Low density	7.20 (1.03)	6.97 (1.47)^{a}	7.52 (.69)^{a}
	High density	7.49 (1.10)^{a}	7.19 (1.45)^{c}	6.80 (1.66)^{ac}

Note: *Means with identical superscripts (^{a,b} and ^{c}) differ significantly in the row:* ^{a,b} $p < 0.05$, ^{c} $p < 0.1$

Arousal
As the degree of stimulation influences the hedonic tone, we will first look at the results of arousal. On *arousal* an interaction effect was found between music and density ($F(2, 338) = 6.43$, $p = .002$, Figure 7.3). An ANOVA showed that when it was busy passengers experienced more arousal with stimulating music than with calming music and no music ($F(2, 344) = 8.41$, $p = .000$). This difference is non-significant for quiet moments. Also apparent was that at busy moments stimulating music aroused more than at quiet moments ($F(1, 344) = 6.16$, $p = .014$). The interaction plot (Figure 7.3) clearly shows how density *and* stimulating music incite extra stimuli.

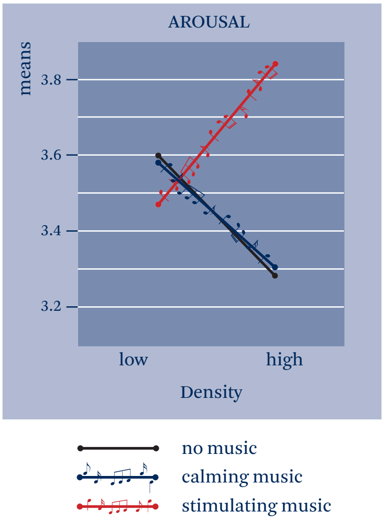


Figure 7.3 Interaction between music and density on the experienced arousal

Hedonic Tone
Musical genre in combination with density influenced the hedonic tone with regard to pleasure and the station score. An interaction was found between music and density on *pleasure* ($F(2, 338) = 9.56$, $p = .000$, Figure 7.4A). An ANOVA revealed that passengers at quiet moments experienced greater pleasure when stimulating or no music was played in comparison with calming music ($F(2, 343) = 4.42$, $p = .013$). At busy moments passengers experienced more pleasure when calming or no music was played in comparison with stimulating music ($F(2, 343) = 7.71$, $p = .001$). It also appeared that stimulating music at quiet moments gave more pleasure than at busy moments ($F(1, 343) = 13.96$, $p = .000$). For calming music the opposite is the case: calming music gave greater pleasure at busy moments than at quiet moments ($F(1, 343) = 6.99$, $p = .009$). For no music this difference is non-significant. Other effects on the degree of pleasure were not found.

An interaction was also found between music and density on the station score ($F(2, 338) = 6.51$, $p = .001$, Figure 7.4B). An ANOVA revealed that at quiet moments passengers assessed the station with a higher score when stimulating music was played as compared with calming music ($F(2, 345) = 3.47$, $p = .032$). No significant differences were found with the condition without music. At busy moments passengers awarded the station a higher score when no music was played as opposed to stimulating music ($F(2, 345) = 3.97$, $p = .020$). There were no significant differences with the calming music condition. Furthermore, stimulating music received a higher station score at quiet moments when compared with busy moments ($F(1, 345) = 10.20$, $p = .002$). This difference was non-significant for calming and no music. The analyses showed no significant effects for the appreciation of the music. Figure 7.4 clearly shows how stimulating music affords a higher hedonic tone on a quiet platform, whereas calming (or no) music affords a higher hedonic tone on a busy platform.

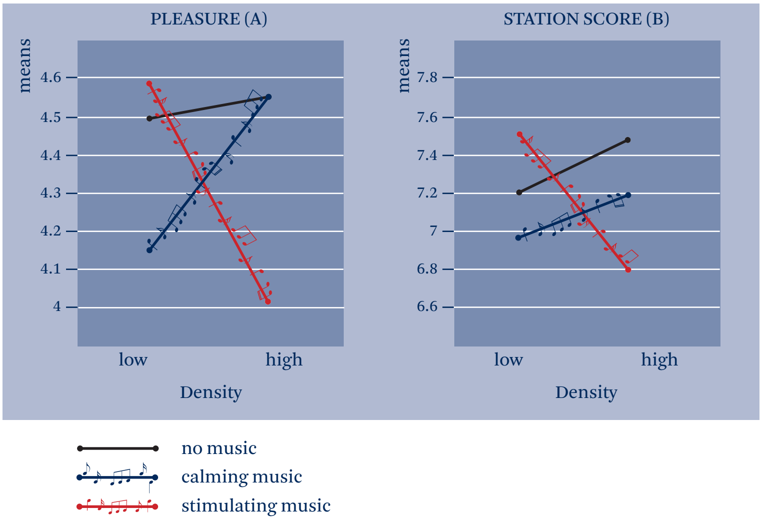


Figure 7.4 Interaction between music and density on pleasure (A) and station score (B)

Waiting experience

This study recorded the objective time. On average respondents spent 7.05 minutes ($SD = 4.18$) at the station, of which an average 4.05 minutes ($SD = 3.30$) were on the platform. A t-test revealed a significant difference between the objective and subjective time on the platform ($t(516) = 28.30$, $p = .000$). The time on the platform appeared to be significantly longer than the actual or objective time. The Time Sense Factor[8]

8 TSF: Time Sense Factor = the subjective waiting time divided by the objective waiting time per experimental subject.

for the platform is 1.51 ($SD = 4.23$). On average, passengers overestimated their waiting time, which is in keeping with the literature (Hornik, 1984; 1992; 1993).

Interactions waiting experience

For waiting experience, two interactions were found between musical genre and passenger type on the time estimation and acceptance of the waiting time. Two three-way interactions were also found on acceptance of the waiting time and hedonic appreciation of the waiting time (pleasant wait). The averages and standard deviations can be found in Table 7.4.

Table 7.4 Means (SDs) of musical genre for time estimation, acceptable and pleasant wait (with low and high density)

		Must			Lust		
		No music	**Calming music**	**Stimulating music**	**No music**	**Calming music**	**Stimulating music**
		M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Time estimation in minutes		3:04 (1:50)^{a}	3:56 (3:13)	4:26 (3:21)^{a}	3:57 (1:48)	4:44 (3:36)^{b}	3:18 (2:42)^{b}
Acceptable wait		4.83 (1.38)	4.81 (1.45)	4.68 (1.22)	5.13 (1.32)^{a}	4.59 (1.38)^{ab}	5.06 (1.43)^{b}
Pleasant wait	**Low density**	3.94 (1.13)	4.06 (1.36)	4.10 (1.16)	3.76 (1.21)^{a}	3.30 (1.21)^{b}	4.47 (1.20)^{ab}
	High density	4.03 (1.48)	3.50 (1.28)	3.57 (1.02)	4.39 (1.25)^{a}	3.86 (1.14)^{c}	3.59 (1.30)^{a}

Note: *Means with identical superscripts (^{a,b} and ^{c}) differ significantly in the row:*
^{a,b} $p < 0.05$, ^{c} $p < 0.1$

An interaction was found between music and type of passenger on the time estimation on the platform ($F(2, 319) = 4.79$, $p = .009$, Figure 7.5A). An ANOVA revealed that with stimulating music lust passengers estimated their waiting time as shorter than with calming music ($F(2, 344) = 3.45$, $p = .033$). There was no significant difference with the condition without music nor were significant differences found for must passengers. It also appeared that with stimulating music lust passengers assessed their waiting time as being shorter than must passengers did ($F(1, 344) = 4.64$, $p = .032$). This difference was neither significant for calming or no music. No other effects on the estimation of the waiting time on the platform and the waiting experience were found.

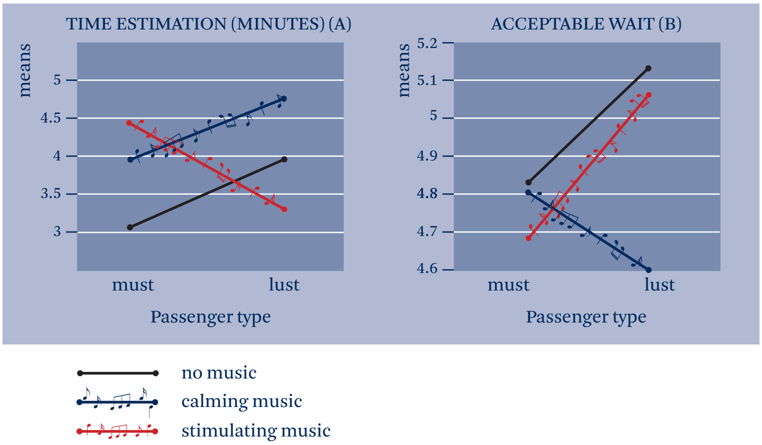


Figure 7.5 *Interactions music and type of passenger on time estimation (A) and acceptable wait (B)*

An interaction was also found between music and type of passenger on the acceptance of the waiting time on the platform ($F(2, 319) = 3.31$, $p = .038$, Figure 7.5B). An ANOVA revealed that lust passengers found the waiting time on the platform more acceptable when there was stimulating music or no music as compared with calming music ($F(2, 338) = 3.59$, $p = .029$). This difference was non-significant for must passengers.

Hedonic waiting time

Finally, the musical genre afforded a more pleasant waiting time. A (marginally) significant three-way interaction was found between music, density and passenger type on the hedonic waiting time of the platform ($F(2, 319) = 2.91$, $p = .056$, Figure 7.6). An ANOVA revealed that lust passengers spent their waiting time more pleasantly at quiet times when stimulating music was played as compared with calming or no music ($F(2, 333) = 7.10$, $p = .001$). When it was busy, lust passengers indicated they spent their waiting time more pleasantly when no music was played than with stimulating or calming music ($F(2, 333) = 3.25$, $p = .040$). These differences were non-significant for must passengers. Furthermore, calming music at quiet moments appeared to have the effect that must passengers experienced their waiting time more pleasantly than lust passengers ($F(1, 333) = 5.86$, $p = .016$). This difference was neither significant for busy moments nor for stimulating and no music. No other effects on the hedonic waiting time were found. The same applies to effects on the utilitarian waiting time.

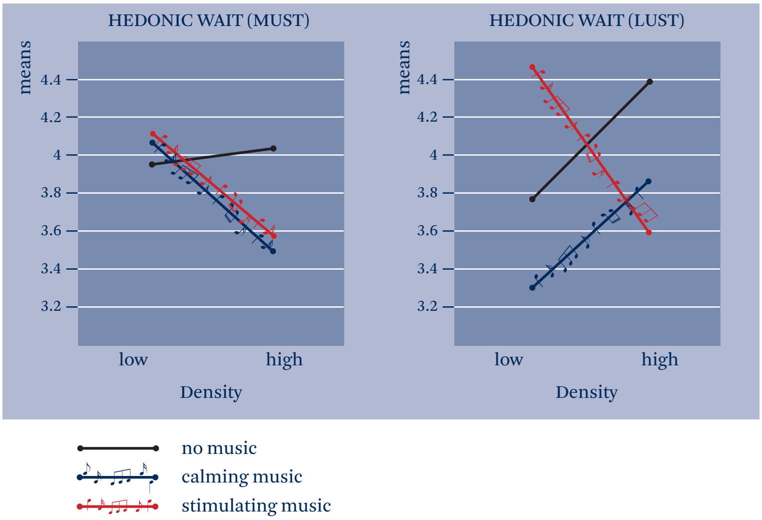


Figure 7.6 Three-way interaction between music, density and passenger type on the hedonic wait on the platform

7.4.5 RETURNING TO THE HYPOTHESES

Hypothesis 1 is confirmed: *Stimulating music in a quiet environment affords a more positive waiting experience and station evaluation as opposed to calming music.* In a busy environment passengers experienced more arousal with stimulating music. At quiet moments with stimulating music the experimental subjects experienced a higher hedonic tone (pleasure and station score). Lust passengers, moreover, seemed to find their wait more pleasant when stimulating music was played on a quiet platform.

Also hypothesis 2 is confirmed: *Calming music in a crowded environment affords a more positive waiting experience and station evaluation as opposed to stimulating music.* In a busy environment with calming music the experimental subjects experienced a higher hedonic tone (pleasure and score).

Hypothesis 3 can be partially confirmed: *Must passengers rate the waiting experience and station more positively with calming music than with stimulating music.* For must passengers hardly any significant effects were found on the station evaluation or the waiting experience. Must passengers did, however, rate their wait more positively than lust passengers when calming music was played in a quiet environment.

Hypothesis 4 can be confirmed: *Lust passengers rate the waiting experience and station more positively with stimulating music than with calming music.* Lust passengers appeared to find the wait more acceptable with stimulating music and they found that stimulating music in a quiet environment made the wait more pleasant than calming music.

Hypothesis 5 is confirmed: *In a quiet environment, lust passengers experience a shorter perceived waiting time with stimulating as opposed to calming music.* Lust passengers estimated the waiting time as being shorter when stimulating music was played as opposed to calming music. In accordance with the attentional model, music distracted lust passengers from the wait. For must passengers no significant differences were found between stimulating and calming music.

7.4.6 DISCUSSION

Interpretation of the results

The assumption of this study was that by playing the right music on a platform, waiting passengers would be offered an optimal level of stimuli which would result in a more positive station and waiting experience. With an optimal level of stimuli the hedonic tone (much pleasure, high score) is raised. In order to achieve the optimal level of stimuli the context is of importance: reversal theory predicts that stimulating music at quiet moments and calming music at busy moments has a positive effect. This also applies to the type of passenger: lust passengers are more receptive to environmental stimuli and it is to be expected that they prefer stimulating music during the wait, whereas must passengers are less receptive to extra environmental stimuli and will have a greater preference for calming music (Appendix 4). A more positive hedonic tone has an effect on the waiting experience; if the passengers experience pleasure, then they will experience the wait more positively (the waiting time is more pleasant and more acceptable), and the wait will seem to be shorter (Baker & Cameron, 1996; Hornik, 1992).

Our findings concur with reversal theory. It is indeed at quiet moments that stimulating music results in a higher hedonic tone (greater pleasure and a higher station score) than calming music, just as it is at busy moments that passengers experience greater pleasure when calming music is played, as opposed to stimulating music (Van Hagen, Pruyn, Galetzka & Sauren, 2010). Figure 7.7 shows how the musical genres and the degree of density are related to the degree of stimulation (arousal) and hedonic tone.

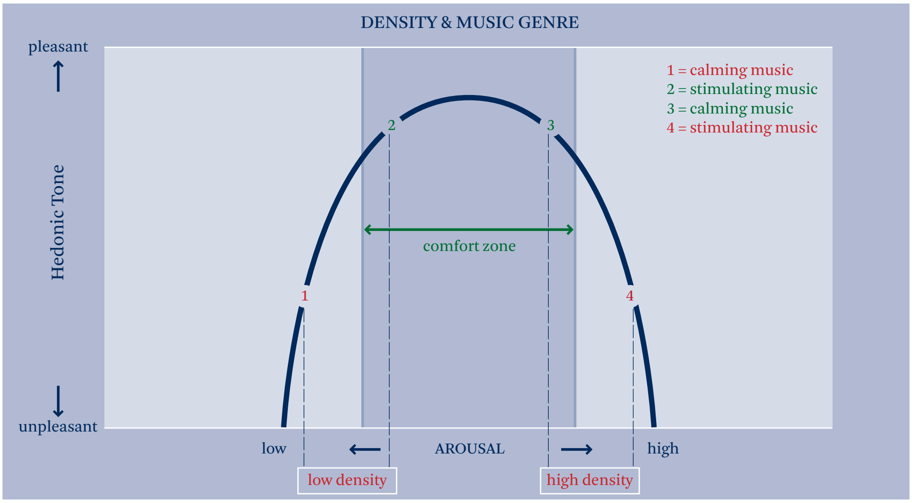


Figure 7.7 Density and music genre related to arousal and hedonic tone

In accordance with reversal theory, calming music appears to result in a more positive waiting experience for must passengers, just as stimulating music does for lust passengers. This applies to the acceptance of the waiting time and to a pleasant wait. Lust passengers find the waiting time more acceptable and pleasant with stimulating music than with calming music. This result supports the premise of reversal theory when applied to the type of passenger: lust passengers are receptive to environmental stimuli. If this need of stimuli is met, then the pleasure increases and the waiting experience is improved. Also apparent is that lust passengers estimate the time as being shorter with stimulating as opposed to calming music. This not only concurs with the attentional model (Zakay & Block, 1997) but also with reversal theory (Apter, 2007). For lust passengers stimulating music affords sufficient distraction, causing them to pay less attention to the time and hence underestimate its duration (*attentional model*). Lust passengers apparently have a greater need of environmental stimuli and/or allow themselves to be distracted, and this concurs with reversal theory. A more pleasant wait and greater acceptance of the waiting time result in a more positive hedonic tone whereby lust passengers underestimate the time (Baker & Cameron, 1996; Hornik, 1984; 1992; 1993).
A remarkable conclusion is that the combination between music and density was actually found on the variables that measured the station experience and that the combination between music and type of passenger had a greater influence on the variables that measured the waiting experience (only with lust passengers). A possible explanation for this might be that the waiting experience depends more on the person, whereas the station experience is based more on the physical environment, e.g. whether the platform is busy or not. Must and lust passengers apparently distinguish themselves more in their preoccupation with time than passengers who travel at busy versus quiet moments.

Restrictions and areas for special attention with regard to future research

Earlier studies showed that music can be effectively deployed in e.g. restaurants (Milliman, 1982; 1986) and supermarkets (Eroglu, Machleit & Chebat, 2005; North, Hargreaves & McKendrick, 1999). Studies into the effects of musical genre in a functional and time-sensitive station environment is a valuable addition, particularly because this study also investigated interactions between type of passenger and density. The findings of the two field studies and the virtual study reinforce one another. By conducting the research in a virtual world, musical genre, density and passenger type could be easily manipulated whilst all the other conditions remained exactly the same. Also the threshold to take part in the study was low, because experimental subjects could participate from behind their own PC at home at a time that suited them.

However, as with any study, also this current method has a number of shortcomings. Although the virtual station appeared to closely reflect reality, the actual level or degree of realism was still lower than in the real world. At a real station, and on a real platform, the senses have to process a richer input than at home behind the computer. This restriction could be overcome by repeating the study at a real station. Another weak point of the study is the possible familiarity with the music. Just how familiar one is with the tracks could influence the perceived waiting time. Yalch and Spangenberg (2000) demonstrated that experimental subjects estimated the time that they spent in the shop as being longer when familiar music was played. Bailey and Areni (2006) found that when tasks had to be performed, unfamiliar music resulted in an underestimation of the waiting time. Sweeney and Wyber (2002) ascertained that it was not the unfamiliarity but how pleasant consumers found the music that determined the waiting experience. Also Hui, Dube and Chebat (1997) observed that the appreciation of the music affords positive emotions and greater approach behaviour, even if familiar music meant the time was overestimated. In order to overcome the influence of preference and familiarity, it might be worth opting in a following study for pleasant yet less well-known music.

Practical implications for NS

This current study offers concrete results for NS. On the basis of the findings, a programme of music can be compiled with the aim of increasing the hedonic tone and shortening the waiting time perception. When it is busy, passengers prefer either no music or calming music. When it is quiet, passengers have a preference for stimulating music. This gives them greater pleasure and results in their awarding the station a higher score. When stimulating music is played, lust passengers moreover estimate their waiting time as being shorter and they find the waiting time more acceptable and pleasant. With regard to the music programming, it would be best not to play any music in the morning peak hours. At such a time of day, people still have to 'get going', which means they are less receptive to extra stimuli. Moreover, the public in the morning rush hour primarily consists of goal-targeted must passengers. During the daytime it is quiet, which is when the majority of lust passengers travel who are more receptive to extra stimuli. In off-peak hours stimulating music could be played on the platforms. In the evening rush hour it is busy again but by this time people have ‘got going’ and can tolerate more stimuli. In addition, the evening rush hour is a mix of must and lust passengers. Music must contribute to a better atmosphere but not overstimulate. At such a moment, calming music would seem to be the best option. By consistently deploying such a programming, the waiting time of passengers will be ameliorated. For smaller stations, where it is quieter on the platforms and passengers are exposed to fewer stimuli, the music compilation can be richer, e.g. by also including calming tracks during the morning rush hour. The volume of the music must be low at all times, however. Audible, yet in the background, so that it is more sub-consciously perceived than immediately noticed. As soon as an information announcement is made, the music will temporarily have to fade further in the background so as not to interfere with the message. Finally, it is important that the passenger can withdraw from the music, e.g. to a quiet zone on the platform.

7.4.7 GENERAL DISCUSSION

Since customers’ visits to both stations and to other public transportation services are to a large extent comprised of waiting, i.e. for the train to arrive, effects of music on perceptions of waiting time are of particular relevance. Previous research suggests that music may contract perceived waiting time (Bailey & Areni, 2006). In addition, research addressing waiting experiences of bus commuters (Durrande-Moreau & Usunier, 1999) stresses the importance of individual differences in explaining effects of waiting. For instance, customers with a more economic time style, i.e. those acutely aware of the usefulness and purpose of their time, were shown to be especially prone to impatience. These customers in particular are likely to appreciate distractions while waiting, such as the presence of music. Research addressing automatic influences on consumer behaviour indicates that consumers are often unaware of environmental factors influencing attitude formation and behaviour, either because these are subliminally presented or because they are not heeded (e.g. Dijksterhuis, Smith, Van Baaren & Wigboldus, 2005).
The findings of the three studies indicate that effects of music were particularly strong under conditions of low density, perhaps suggesting that music was much more salient in the quieter, low-density condition compared with the high-density condition. All three studies demonstrate that stimulating and up-tempo music at quiet moments has positive effects on both the station evaluation and the waiting experience. At busy moments the music must be more carefully chosen, because passengers could easily get overstimulated. At such times it would be better to either abstain from playing music altogether or opt for slow and calming music.

Future research

The combined findings clearly indicate that, although a public transportation environment can be considered a function-oriented or informational service environment rather than a hedonic or leisure one, customers do value distractions or entertainment when used appropriately. In other words, by meeting customers' need for stimulation at all too quiet times, the availability of entertainment and distractions may increase customers' perceptions of control, and in turn positively impact the service experience. As such, our findings are in line with the conceptualization of control as a direct consequence of need fulfilment (Ward & Barnes, 2001), indicating that perceived control is not only a matter of physical control, e.g. sensory control or freedom of movement, over the environment.

Although music may certainly contribute to the service experience, service managers should keep in mind that freedom of choice (i.e. in our study the choice of whether or not to listen to music) is (also) an important antecedent of perceived control (Averill, 1973; Hui & Bateson, 1991; Mills & Krantz, 1979). Of course, for specific segments of travellers, portable music systems provide alternative means to withdraw from aversive stimuli.

Finally, a few limitations of the present studies deserve attention. In the studies, data were gathered in a very specific service setting (i.e. a railway station in the Netherlands), which calls into question the generalizability of our findings. A note concerns also the measurement of our variables. As discussed, in the field studies the participants filled in the questionnaires on the platform but were given the chance to complete the task in the eagerly awaited train. In hindsight, it may well be the case that the change of environment, i.e. from the platform to the train, had an impact on the results reported. In our studies we tried to minimize this problem by restricting the number of questions to an absolute minimum. In the study in the virtual world, despite a few shortcomings, disruptive environmental factors, such as delayed trains or bad weather, can be easily controlled. Although the virtual station was a close rendering of reality, it does remain a quite sterile environment. At a real station and on a real platform the senses have to process other input than when at home behind the computer, which implies that there might be a discrepancy in the results. The present study should therefore be replicated, e.g. by testing the same conditions in a real-life situation. In the meantime, our findings stress the importance of insights into the interactive effects of environmental factors in service environments. A clear understanding of the processes involved allows managers to counteract potential negative effects of uncontrollable factors, such as density, and to lay the foundation for a memorable service experience.

CHAPTER 8

ADVERTISING AND INFOTAINMENT

‘IT MUST TAKE LONGER
FOR MORE THINGS TO HAPPEN.’

KELLARIS & ALTSECH, 1992

ation

8.1 INTRODUCTION

In Chapters 6 and 7 we saw that manipulating the *ambient* dimension (Baker, 1986) of the servicescape with colour, light and music had a positive influence on the evaluation of both platform and waiting experience even though passengers were barely aware of the manipulations. Several studies have shown that with the aid of technical measures, such as infotainment, the quality of the service in retail environments can be increased (Burke, 2002; Newman, Dennis & Zaman, 2006). It is for that reason that screens with infotainment are being used increasingly often in shops and public areas (Derval, 2007; 2009). As infotainment can also offer distraction and easen the wait on a platform, this chapter will address the effects of the *design* dimension (Baker, 1986) of the servicescape with alternating commercials and screens narrowcasting infotainment. We expect the changing images to function as explicit distractors and to attract greater attention from the passengers than other *ambient* environmental elements, such as colour and light. As in Chapters 6 and 7, this chapter will commence with a field study to first ascertain whether the manipulation with moving images does actually lead to a positive station and waiting experience. Following the field study will be two studies in a virtual world, where the effects of moving images in the shape of advertising and infotainment will be studied in various situations. Differences in density and passenger type are included as moderators.

8.1.1 ADVERTISING, INFOTAINMENT AND WAITING EXPERIENCE

Very little research has been published on outdoor advertising and its influence on the emotions, behaviour and waiting experience. It appeared from research by Derval (2007; 2009) that people in a wait situation have more time to take in their surroundings and that the advertising content is remembered two to three times better than television commercials. Dennis, Newman, Michon, Brakus and Wright (2010) posited in a study of 'digital signage' (narrowcasting), that it might be considered part of the surroundings. They demonstrated how digital signage evokes approach behaviour and is mediated by an affective reaction.

Research on outdoor advertising has shown that people usually take one to two seconds to look at it (Van Meurs & Aristoff, 2009), and that moving images attract more attention than static ones (Bolls, Darrel & Muehling, 2003; Dennis, Newman, Michon, Brakus & Wright, 2010; Katz, Larson & Larson, 1991; Reeves & Nass, 1996). Apter (2007) distinguished between *focus* and *fringe*, whereby *focus* is that to which attention is paid and *fringe* the rest of the environment of which one is continually aware albeit not fully consciously. It has been shown that moving images draw people's attention both consciously and unconsciously (Bolls, Darrel & Muehling, 2003; Dennis et al., 2010), whereby infotainment not only consists of an informative component that is consciously perceived and processed but also an ambient component (colours, background images) that is unconsciously perceived and processed

(Bolls, Darrel & Muehling, 2003; Lang, 2000). Conscious attention *(focus)* is paid to the content of the images and unconscious attention *(fringe)* to the appeal thereof (Apter, 2007; Bolls, Darrel & Muehling, 2003). In the studies in this chapter, we expect infotainment to primarily attract passengers' attention, thereby distracting them from the time, but that the images themselves might also be so appealing as to have a positive effect on the platform experience and thus also the waiting experience. As density and goal-orientedness will co-determine how infotainment is evaluated, these will be included in the studies as moderators.

8.2 STUDY 1 EFFECTS OF INFOTAINMENT ON THE PLATFORM, A FIELD STUDY

The focus of this study was to investigate how waiting passengers react to infotainment on a platform and whether infotainment can influence the waiting experience and evaluation of the platform. As mentioned before, reversal theory (Apter, 2007) poses that the need of environmental stimuli is dependent on the context, such as the degree of platform density. An environment that corresponds with the desired number of stimuli seems to effect an increase in customer satisfaction (Wirtz, Matilla & Tan, 2000). A combination of infotainment and a dense platform can create overstimulation which in turn can result in a lower hedonic tone. In a quiet environment, such as during off-peak hours, passengers are exposed to few stimuli whereby they can perceive the platform as bland and become bored. By purposely adding stimuli in the form of infotainment, the arousal level can be increased and passengers can experience greater pleasure. NS also has to cater for passengers with divergent travel motives who differ in goal-orientedness, the so-called must and lust passengers (Chapter 4). Must passengers are cognitively engaged in the processing of information. They are also less receptive to stimuli and aspire more to peace and quiet. In comparison, lust passengers are less goal-directed, are not in a hurry and are expected to be more receptive to environmental stimuli, such as infotainment. On the basis of reversal theory, we expect an interaction between the degree of density and infotainment and passenger type and infotainment, hence our formulation of the following hypotheses:

H1: *In a quiet environment infotainment affords more stimuli for passengers and initiates a more positive station and waiting experience. We expect this effect to be more pronounced for lust passengers.*

H2: *In a busy environment infotainment affords too many stimuli for passengers and leads to a more negative station and waiting experience. We expect this effect to be more pronounced for must passengers.*

8.2.1 METHOD

In this field study we enquired after the effects of infotainment on the perception of the waiting and platform experience on a platform of Leiden Central Station. A 2 (infotainment: infotainment vs no infotainment) x 2 (density platform: low density x high density) x 2 (passenger type: must vs lust) between-subjects design was marked out to answer the specified hypotheses. The experiment consisted of two phases and concerned a trial run of seven flatscreens installed in several places on the platform. In the first phase (September 2009) infotainment was not narrowcasted (control situation) and participants saw black screens, but in the second phase (May 2010) infotainment was narrowcasted (Figure 8.1). In order not to overstimulate the passengers, the images were not accompanied by sound. The 15-minute programmes disseminated information on domestic and foreign news, the weather, the arts, events, local history, work on the rail and on NS and ProRail. The programming was updated each morning and afternoon. Passengers who had been waiting on the platform were invited to fill in a questionnaire *after* their train had departed.

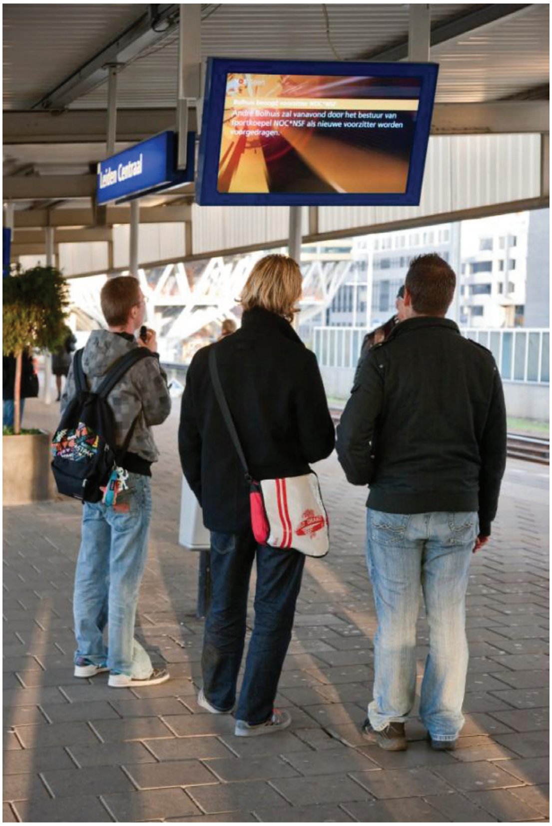


Figure 8.1 Travellers watching an infotainment screen

8.2.2 MEASUREMENT INSTRUMENTS

- *Acceptance of waiting time* was measured on a 7-point scale: "I found the waiting time on the platform: unacceptable–acceptable."
- *Utilitarian and hedonic waiting time* was measured on the basis of the shopping values (Batra & Ahtola, 1991), which measure both the *hedonic* (3 items, 7-point Likert scale Coefficient Alpha = .86) and *utilitarian* time appreciation (3 items, 7-point Likert scale, Coefficient Alpha = .87). An example of utilitarian waiting time: "Was the time you spent waiting on the platform: useful–useless, valuable–worthless, etc.?" An example of the hedonic waiting time: "Was the time you spent waiting on the platform: pleasing–annoying, happy–sad, etc.?"
- *Time perception:* Measures included the subjective estimations of time spent on the platform: "If you had to guess, how long do you think you were on the platform (in minutes)?"
- *Evaluation of the platform* was assessed by asking participants to evaluate the platform by awarding a score on a 10-point scale *(1 = very poor, 10 = excellent).*
- *Perceived density* was measured on a bipolar scale: "The platform was full of people" vs "There were hardly any people on the platform."
- *Passenger type:* The difference between *must* and *lust* passengers was based on the purpose of the journey: must = work, school, study, dentist, hospital; lust = social or recreational purposes.
- *Infotainment:* The independent variable 'infotainment' relates to whether infotainment was either narrowcasted or not (the latter being the control condition).

8.2.3 SUBJECTS

The control condition consisted of 615 respondents who had been waiting on the platform with screens hanging from the ceiling on which no infotainment was narrowcasted. In the infotainment condition infotainment was continually narrowcasted and 211 respondents participated. Of the total sample 55% were woman. Average age of respondents was 30.6 years (*SD* = 14.5) in the first sample and 36.1 years (*SD* = 15.7) in the second.

8.2.4 RESULTS STUDY 1

Noticing the screens

In the control condition 35% of the passengers noticed one or more screens hanging on the platform ceiling, compared to 65% during the second measurement when infotainment was narrowcasted. In total 17.5% reported to have looked at the content. On average passengers reported to have watched the infotainment screens for two minutes. We can thus conclude that infotainment does attract the attention of passengers.

Effects of infotainment

First we performed a MANOVA with four dependent variables: acceptable wait, perceived waiting time, utilitarian waiting time and hedonic waiting time. Infotainment, perceived density and passenger type were specified as independent variables in the model. In the multivariate tests, main effects were found for passenger type and infotainment versus no infotainment (Table 8.1). No main effect was found for perceived density nor were any interactions found.

Table 8.1 MANOVA (Wilks' Lambda) for variables waiting experience (acceptable wait, perceived waiting time, hedonic and utilitarian wait)

	Variables waiting experience		
	F	*Df*	*p*
Infotainment	2.43	4, 724	**.05**
Density	<1	4, 724	*ns*
Passenger type	3.0	4, 724	**.02**
Infotainment * density	<1	4, 724	*ns*
Infotainment * passenger type	<1	4, 724	*ns*
Passenger type * density	<1	4, 724	*ns*
Infotainment * density * passenger type	<1	4, 724	*ns*

WAITING EXPERIENCE

As the MANOVA showed significant results, ANOVAs were performed, the averages and standard deviations of which are reported in Table 8.2. The ANOVAs showed that passengers found the wait more pleasant with infotainment than without ($F(1, 735) = 4.74$, $p = .03$). Passengers also felt they had spent their time more usefully with infotainment than without ($F(1, 735) = 6.34$, $p = .01$). Also apparent was that must passengers assessed their wait as shorter ($M = 06:36$, $SD = 5:36$) than lust passengers ($M = 08:32$, $SD = 6:53$; $F(1, 757) = 9.88$, $p = .002$). However, as the objective waiting time was not recorded, it is unclear whether lust passengers did indeed have a longer wait or whether they assessed it as being longer than must passengers. Furthermore, no main effects or interactions were found for acceptable wait and perceived waiting time.

Table 8.2 Means (SDs) main effect infotainment on hedonic wait, utilitarian wait and platform score

	Infotainment	
	No infotainment	**Infotainment**
	M (SD)	*M (SD)*
Hedonic wait	2.33 (1.42)	2.65 (1.28)*
Utilitarian wait	2.97 (1.32)	3.35 (1.28)**
Platform score	6.6 (1.4)	7.1 (1.2)**

Note: *Means with * and ** differ significantly in the row: ** $p < 0.01$, * $p < 0.05$*

EVALUATION OF THE PLATFORM

Also the evaluation of the platform was enquired after, besides the waiting experience. An ANOVA with platform evaluation as dependent variable and infotainment, passenger type and density as independent variables showed a main effect and two interactions. As main effect the evaluation of the platform appeared to be higher with infotainment than without infotainment ($F(1, 756) = 17.3$, $p = .000$; Table 8.2). Moreover, interactions were found between infotainment and density ($F(1, 756) = 4.2$, $p = .04$) and between infotainment and passenger type ($F(1, 756) = 3.8$, $p = .05$). When it was busy, passengers awarded a higher platform score with infotainment than without it ($F(1, 756) = 14.58$, $p = .000$). This applies to a lesser degree to a quiet platform, i.e. passengers still award a higher score with infotainment than without but these differences are smaller and not significant ($F(1, 756) = 3.26$, $p = .07$). Figure 8.2A shows the interaction and Table 8.3 the averages and standard deviations.

Table 8.3 Means (SDs) infotainment and density (low/high) on platform score

		No Infotainment	Infotainment
		M (SD)	*M (SD)*
Platform score	**Low density**	6.8 (1.3)	7.0 (12)#
	High density	6.5 (1.2)	7.3 (.8)*

Note: *Means with * and # differ significantly in the row: * $p < 0.001$, # $p < 0.1$*

Table 8.4 Means (SDs) infotainment and passenger type (must/lust) on platform score

		No Infotainment	Infotainment
		M (SD)	*M (SD)*
Platform score	**Must**	6.6 (1.4)	6.9 (1.2)*
	Lust	6.7 (1.3)	7.5 (.9)**

Note: *Means with * and ** differ significantly in the row: ** $p < 0.001$, * $p < 0.05$*

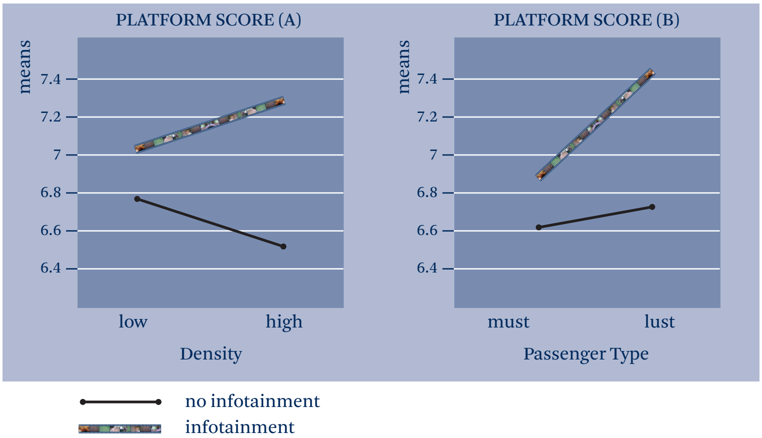


Figure 8.2 Influence of yes/no infotainment on the platform evaluation for density (A) and passenger type (B)

Lust passengers also appeared to give a higher score to the platform with infotainment than without ($F(1, 756) = 13.85$, $p = .000$), and the same applied to must passengers although to a lesser extent ($F(1, 756) = 3.73$, $p = .05$). Figure 8.2B shows the interaction and Table 8.4 the means and standard deviations.

8.2.5 RETURNING TO THE HYPOTHESES

On coupling the results with the hypotheses, it appears that the latter can be partially confirmed. As expected, infotainment affords passengers a more pleasant and useful wait and a higher score, with the highest score for the platform being awarded by lust passengers. A remarkable result (and different to what we expected) was that infotainment was more highly appreciated on a busy platform than on a quiet one. It is possible that passengers in a busy environment together with screens with moving images experience so many stimuli that an *information overload* (Lang, 2000) arises. In such a situation, passengers might stop paying attention to the intrinsic message of the infotainment yet be more receptive to the appeal of the images (Bolls, Darrel & Muehling, 2003), whereby infotainment in a busy environment sooner functions as an *ambient* than as a *design* element and is thus more positively valued. However, it is also possible that there is so little to arouse when it is quiet that even with infotainment passengers experience too few stimuli and hence have a lower esteem for the platform. In contrast, a busy platform combined with infotainment affords passengers sufficient stimuli, thus resulting in a better appreciation.

8.2.6 CONCLUSIONS

The results of this study demonstrate how passengers find the wait more useful and pleasant with infotainment than without, as well as their awarding the platform with infotainment a higher score (7.1 instead of 6.6). Passengers awarded the highest score when infotainment was shown on a busy platform. Particularly lust passengers gave the platform with infotainment a higher score. It can be concluded that platform infotainment is a welcome distraction that makes the wait more pleasant and useful and leads to a positive evaluation of the platform. As this study demonstrated in practice the notably positive effects of infotainment on the platform experience, it was interesting to take a closer look at whether it also influences the waiting experience. To this end we conducted two studies in the virtual world, the first addressing the effect of advertising and the tempo or pace of screen changes (study 2) and then addressing different kinds of infotainment: topical affairs, train information and entertainment (study 3). One advantage of the virtual world is that the objective waiting time can be easily recorded and the moderators density and goal-orientedness can be incorporated in the research design.

8.3 STUDY 2 EFFECTS OF THE SCREEN CHANGE PACE OF ADVERTISING ON BUSY AND QUIET PLATFORMS[9]

8.3.1 INFOTAINMENT AND TIME PERCEPTION

Research has shown that the speed, also known as the pace (Bolls, Darrel & Muehling, 2003) with which images alternate can be regarded as *contextual changes*. The pace influences arousal (Bolls, Darrel & Muehling, 2003; Lang, 2006; Reeves & Nass, 1996) and the waiting experience (Brown, 1995; Poynter, 1989; Poynter & Homa, 1983). Brown (1995, p. 115) posits that: *'Given that change is a fundamental property of the natural environment, it is perhaps not surprising that timing is attuned to, and affected by, the motion and speed of moving objects.'* Studies have demonstrated that fast screen changes sooner attract one's attention than slow ones but that they also afford an *information overload* sooner, causing the ad's message to be less well remembered than with slower screen changes (Bolls, Darrel & Muehling, 2003; Lang, 2000; Newman, Dennis & Zaoman, 2006). It is unclear whether moving images result in a shorter estimation of time owing to distraction (*attentional model*) or actually to a longer estimation of time owing to more information having to be processed (*storage size* and *contextual change/segmentation model*, Chapter 3). In the following two studies, to be carried out in a virtual world, we will investigate what influence advertising and infotainment have on the station and waiting experience.

9 This study was presented at the European Transport Conference (Van Hagen, Pruyn, Galetzka & Kramer, 2009).

8.3.2 HYPOTHESES STUDY 2 AND 3

Several studies have shown that a distractor reduces the perceived waiting time and makes the wait more pleasant. Advocates of the *attentional model* allege, for example, that a distractor reduces people's perception of time because they are being kept cognitively occupied – hence there is less cognitive power to be occupied with the time, which makes it seem to pass more quickly (Pruyn & Smidts, 1998; Thomas & Weaver, 1975; Zakay & Block, 1997). A meta- analysis by Durrande-Moreau (1994; 1999) comprising 18 studies of waiting experience demonstrated that when one is cognitively occupied with an activity, time seems to pass more quickly than when one passively lets it pass by. We found the same results in the field study on waiting time (Chapter 5). Adding a distractor to the station environment, such as advertising or infotainment, can therefore cause the passenger's perceived waiting time to be reduced. On the basis of relationships and connections found in the literature, we formulated the following hypotheses

H1a: *Passengers experience a shorter perceived wait in a station environment with advertising and infotainment than without advertising and infotainment.*

According to the *contextual change model*, explicit distractors such as advertising and infotainment actually result in a more prolonged time interval (the wait), because more seems to have happened during that period (Bolls, Darrel & Muehling, 2003; Poynter, 1989; Poynter & Homa, 1983). Hypothesis 1b was thus formulated as an alternative to hypothesis 1a:

H1b: *Passengers experience a longer perceived wait in a station environment with advertising and infotainment than without advertising and infotainment.*

Fast screen changes afford greater arousal, thus automatically drawing one's attention to the images (Bolls, Darrel & Muehling, 2003) and distracting one from the time. A great deal of information with fast screen changes can result in a longer estimation of the time and even to an *information overload* (Bolls, Darrel & Muehling, 2003; Lang, 2000). From Brown's research (1995), it appears that the duration of fast stimuli was perceived as being longer than slow stimuli. Also the perceived time was longer with fast moving images than with slow moving images. On the basis of these findings, we expect a slow image tempo to result in a shorter time perception than a fast image tempo. Hypothesis 2 thus reads:

H2: *A slow pace of platform wall advertising results in a shorter subjective waiting time than a fast pace of platform wall advertising.*

The physical service environment is an important factor when assessing the service and is likewise important when determining the quality (Hui, Dubé & Chebat, 1997).

Adding an environmental element to the service environment can be compared with the addition of good quality to a product (Bitner, 1992). Advertising and infotainment can be considered an environmental element which can positively influence the evaluation and quality assessment of the service provider (Burkes, 2002; Newman, Dennis & Zaman, 2006). Hypothesis 3 is thus:

***H3:** The evaluation of the service and quality is more positive on a platform with advertising and infotainment than on a platform without advertising and infotainment.*

Passengers who experience the wait as pleasant and who are not bored will return to the station with greater enthusiasm. This expectation was endorsed in research by Hui, Dubé and Chebat (1997), who found that a positive affective reaction to waiting time results in greater approach (and less avoidance) behaviour. Also Dennis et al. (2010) ascertained that digital signage leads to approach behaviour. Hypothesis 4 thus reads:

***H4:** Passengers on a platform with advertisement and infotainment will show more approach behaviour compared with a platform without advertisement and infotainment.*

8.3.3 METHOD

In an on-line experiment, subjects (members of the NS customer panel, Appendix 1) were invited to navigate through a virtual station on the basis of a fixed passenger scenario. Half of the respondents were asked to imagine that they were in a hurry (must scenario) and the other half was asked to imagine that they were going on a pleasure trip (lust scenario). The density on the platform was also manipulated. Half of the respondents were confronted with a quiet station and the other half with a busy station. On the spot the train was expected to depart from, advertisements were projected onto the opposite platform wall (Figure 8.3) under varying conditions of image renewal. One quarter of the respondents saw ad messages that followed one another relatively quickly (renewal every 20 seconds), one quarter saw ad messages that were alternated more slowly (every 40 seconds), one quarter saw no renewal of the message (i.e. they saw one and the same message during the entire wait), and the final quarter saw no ad message at all (control condition).

Figure 8.3 Platform wall advertising

The experimental design consisted of a 4 (pace screen change: no advertising vs static vs slow vs fast) x 2 (density: peak vs off-peak) x 2 (passenger type: must vs lust) between-subjects design.

8.3.4 PROCEDURE

Members of the NS panel (Appendix 1) received an email in which they were asked to participate in the study. A link led respondents to an introduction page where they were asked to install a plug-in which was required to allow the virtual model to run on their computer. After further instructions, respondents were given a scenario to read in which they were asked to catch a specific train. The scenario explained whether one was a must passenger (in a hurry for an important meeting) or a lust passenger (not in a hurry and with the prospect of a pleasant day out). Respondents were then sent to the virtual station and randomly assigned to one of the eight conditions (pace screen change and density). The virtual station had a 10-minute cycle. Respondents entered the cycle at a random moment and thus had a different objective waiting time. After catching the right train, respondents were redirected to the questionnaire.

8.3.5 RESPONDENTS

Respondents were all members of the NS customer panel and hence a good representative of its daily passenger population. Respondents were free to choose their moment of participation. In total 487 panel members took part in the experiment, of which 303 (62%) were men and 184 (38%) were women. The mean age of the respondents was 43 years (*SD* = 15.3, min. 14 years, max. 78 years).

8.3.6 MEASUREMENT INSTRUMENT

After navigating the virtual station and catching the train, respondents had to fill in a questionnaire in order to measure the perception of both station and waiting time. The questionnaire commenced with constructs that measured waiting time perception and were included at the beginning because the wait experience would then still be fresh in the respondents' memory.

Measures Waiting experience
The variables (with the exclusion of time experience and score) were measured with a 7-point Likert scale. The station waiting experience was measured with the following variables (Table 8.4):

– *Time perception:* First asked was the *perceived (subjective) waiting time* in minutes at the station and on the platform with the question: “If you had to guess, how long do you think you were at the station/on the platform (in minutes)?” Then we measured the *cognitive evaluation of the waiting time* (long/short) with the question: “How did you experience the time spent at the station?” (*1 = very short, 7 = very long*).
– *Acceptable wait*: Subsequently we measured the *acceptance of the waiting time* by asking how acceptable one found it (*1 = unacceptable, 7 = acceptable*).
– *Utilitarian and hedonic waiting time:* The utilitarian waiting time (did one spend the time usefully, measured with five items) and the hedonic waiting time (did one spend the time pleasantly, measured with three items) were measured for the waiting time on the platform by using items of the Shopping Values of Batra and Ahtola (1991). Example utilitarian waiting time: “Was the time you spent waiting on the platform: useful–useless, valuable–worthless, etc.” Example hedonic waiting time: “Was the time you spent waiting on the platform: pleasing–annoying, happy–sad, etc.”

Measures Station evaluation
The station experience was measured with the following variables (Table 8.5):

– *Emotions:* For the PAD emotions an adapted scale of Mehrabian and Russell (1974) was used. *Pleasure* was measured with six bipolar items (unhappy–happy, annoyed–pleased, melancholic–contented, unsatisfied–satisfied, despairing–hopeful, unpleasant–pleasant). *Arousal* was measured with six items (stimulated–relaxed, excited–calm, frenzied–sluggish, jittery–dull, wide awake–sleepy, aroused–unaroused). *Dominance* was measured with four items (influenced–influential, cared for–in control, guided–autonomous, submissive–dominant).
– *Approach behaviour* was measured on the basis of the ‘approach and avoidance’ scale of Russell and Mehrabian (1974), and consisted of five items. Examples: “I would recommend this station to others” and “I would have no problem returning to this platform.”
– *Platform score*: Experimental subjects were requested to award a score for their assessment of the quality of the platform (*1 = very poor, 10 = excellent*).

The questionnaire also included several manipulation checks. *Perceived density* was measured with the aid of the perceived crowding scale (Harrell, Hutt & Anderson, 1980), which consists of three items (Coefficient Alpha = .80). Furthermore there were three items that aimed to measure the *attitude to advertising at the station* (Coefficient Alpha = .95), and finally, several *demographic variables* (gender, age).

Table 8.5 Cronbach Alpha, Min., Max., M and SD of the dependent variables

	Advertisement study				
	α	Min.	Max.	M	SD
STATION EXPERIENCE					
Pleasure	.89	1	7	4.29	.46
Arousal	.81	1	7	3.77	.53
Dominance	.72	1	7	3.74	.64
General appreciation environment	.88	1	7	4.40	1.31
Approach behaviour	.90	1	7	4.14	1.22
Platform score	–	1	10	6.73	1.35
WAITING EXPERIENCE					
Time perception platform	–	0	25	4:31	3:25
Acceptance waiting time	–	1	7	5.35	1.45
Cognitive time perception	–	1	7	4.15	1.85
Utilitarian waiting experience	.89	1	7	3.61	.73
Hedonic waiting experience	.94	1	7	3.96	.50

8.3.7 RESULTS STUDY 2

Presence of platform wall advertising and station experience

A large portion of the experimental subjects (62.4%) indicated having seen the platform wall advertising. On average they looked at the screen for 52 seconds. On enquiry, the presence of the platform wall advertising was valued just below the scale average. The experimental subjects did not find that the presence of the wall advertising improved the appearance of the platform ($M = 3.71$, $SD = 1.96$), nor that the station as a whole looked better due to the screens ($M = 3.87$, $SD = 1.92$). This already gives an indication for the testing of hypothesis 3 in which the expectation was formulated that platform advertising would lead to a more positive evaluation of the service quality at the station. A correct testing of the hypotheses entailed that subjects who had seen the advertising were distinguished from those who had not. A comparison of the two groups revealed a difference in the overall evaluation of the quality of the platform, albeit the opposite to what we had expected (Table 8.6): passengers who had seen the wall advertising awarded a lower score to the platform than passengers who had not seen it ($F(1, 473) = 6.87$, $p < .01$). However, the platform evaluation might be influenced by the waiting time. In their study of the influence of television in hospital waiting rooms, Pruyn and Smidts (1998) found that people who watched TV objectively had a longer wait and posited that people only look at the screen when they start to get bored, i.e. when they have already been waiting for a while: '*Presumably, people start to watch TV only after some time. Our results would rather seem to indicate that it is sooner the length of the wait (and thus boredom) that* *induces people to start watching'* (Pruyn & Smidts, 1998, p 332). On closer analysis it appeared that experimental subjects who had seen the advertising had indeed waited twice as long on the platform ($F(1,487) = 45.16$, $p = .000$) and thought their wait was long ($F(1,486) = 82.97$, $p = .000$, Table 8.7). It seems feasible that the lower platform score was influenced by the longer waiting time and this was confirmed by further analyses on the platform experience. Platform wall advertising also affects dominance, arousal, pleasure and approach behaviour. The sense of control (dominance) appeared greater in the condition without platform wall advertising than in the condition with advertising ($F(1, 575) = 33.90$, $p <.01$, Table 8.6). Also arousal appeared greater in the condition without advertising than in the condition with advertising ($F(1, 472) = 6.72$, $p = 0.01$, Table 8.6). However, the experimental subjects experienced greater pleasure with the presence of platform wall advertising than without ($F(1, 581) = 29.38$, $p <.01$, Table 8.6), just as its presence also scored higher in approach behaviour ($F(1, 590) = 4.95$, $p = .03$, Table 8.6), even if the passengers' wait had been longer than those who did not see the advertisements. So, subjects would return to a platform with greater enthusiasm if it had wall advertising and they would be more positive about the station to friends and acquaintances than if the platform had none. These findings support both hypothesis 3, which predicted that platform wall advertising would be appreciated by passengers, and hypothesis 4, which predicted that advertising would lead to more approach behaviour from passengers.

Table 8.6 Means (SDs) of platform experience if advertising was seen yes/no

Platform experience	**No advertising seen**	**Advertising seen**
	M (SD)	*M (SD)*
Platform score	7.15 (1.18)	6.82 (1.39)**
Pleasure	4.01 (.58)	4.29 (.46)**
Arousal	3.85 (.56)	3.72 (.56)**
Dominance	4.14 (.68)	3.75 (.64)**
Approach behaviour	3.86 (1.16)	4.15 (1.23)*

Note: *Means with * and ** differ significantly in the row: ** $p < 0.01$, * $p < 0.05$*

Presence of platform wall advertising and waiting experience

Hypothesis 1 proposed that the presence of platform wall advertising alters the way in which passengers perceive the subjective waiting time as shorter (hypothesis 1a) or longer (hypothesis 1b). No differences were found in the estimations of waiting time as a function of platform wall advertising ($F < 1$). The presence of platform wall advertising did not appear to have an effect on the time sense factor[10] either ($F < 1$). However, passengers did find that their wait was spent more usefully (Table 8.7,

10 TSF: Time Sense Factor = the subjective waiting time divided by the objective waiting time per experimental subject.

utilitarian waiting time) when there was platform wall advertising than when there was none ($F(1, 594) = 13.31$, $p < .01$), and that the time was also more pleasant with than without ($F(1, 596) = 3.50$, $p = .06$, Table 8.7, hedonic waiting time). True, this last difference is not significant but it does show a very strong leaning toward the predicted direction. So, advertising does not seem to influence the time perception but it does positively influence the experience of the waiting time.

Table 8.7 Means (SDs) waiting experience if advertising was seen yes/no

	No advertising seen	Advertising seen
	M (SD)	*M (SD)*
Objective waiting time platform *(in minutes)*	3:39 (4:05)	6:14 (4:59)**
Cognitive waiting experience platform *(1 = short, 7 = long)*	2.93 (1.77)	4.39 (1.67)**
Utilitarian waiting time	3.28 (1.34)	3.61 (.73)*
Hedonic waiting time	3.83 (1.16)	3.96 (.50)#

Note: *Means with *, ** and # differ significantly in the row: ** p < 0.01, * p < 0.01, # p < 0.1*

The tempo of ad renewal and waiting experience

In hypothesis 2 we expected that a slow tempo of screen change would result in a shorter subjective waiting time than a fast one. This hypothesis cannot be confirmed ($F<1$). However, other main effects of the renewal tempo of the platform wall advertising were found that indeed warrant further investigation of the relationship between image pace and waiting experience. The tempo of the platform wall advertising influenced the *cognitive* evaluation of the wait. In the fast condition the short/long assessment is significantly lower than in the static condition ($F(2,483) = 3.43$, $p = .03$). This implies that subjects in the fast condition felt that their wait had been shorter ($M = 3.61$, $SD = 1.54$) than subjects in the static condition ($M = 4.07$, $SD = 1.58$). Furthermore, the tempo also influences the acceptance of the wait. In the condition with the slow tempo, subjects found the waiting time less acceptable ($M = 5.33$, $SD = 1.51$) than in the condition with the fast tempo ($F(2, 486) = 3.51$, $p = .03$; $M = 5.75$, $SD = 1.34$). In accordance with Zakay and Block's *attentional model* (1997), one explanation might be that passengers sooner appreciate the extra stimuli offered by the quickly alternating ad images, thus distracting them from the wait. To summarize: fast screen changes (every 20 seconds) with platform advertising have positive effects on the evaluation of the waiting time (short/long assessment) and the acceptance of the wait, without this resulting in an actual lower estimated (subjective) waiting time.

Conclusion

Platform wall advertising seems to result in a quite varied and interesting pattern of findings. On the one hand, respondents in this study do not react particularly

positively when they are asked to pronounce judgement on this form of station advertising. They do not think that such forms of advertising contribute to a positive appearance. On the other hand, the presence of platform advertising does result in all kinds of positive experiential, attitudinal and behavioural effects and so, too, does the tempo of screen change seem worthy of deployment in influencing the waiting experience.
In the third study we will investigate whether these findings can be replicated with another form of distraction in the service environment, namely infotainment. Particularly the choice of content is definitive for the user's assessment of infotainment. For this reason, we manipulated the type of programming in the experimental study in order to evaluate the effects of passengers' evaluation and behaviour.

8.4 STUDY 3 DIFFERENT TYPES OF PROGRAMMING INFOTAINMENT ON THE PLATFORM[11]

8.4.1 METHOD

In this study we investigated whether and how infotainment as an explicit distractor in a station environment influenced the station and waiting experience. This was done with a 4 (type of programming: no programme vs (passenger) information vs entertainment vs an NS promotion film) x 2 (density: off-peak hours vs peak hours) x 2 (passenger type: must vs lust) between-subjects design. As in the second study, this experimental design was tested at an online virtual station. On the virtual platform, screens had been placed on which non-stop infotainment was shown (Figure 8.4). One quarter of the subjects were able to watch an informative programme with passenger information, one quarter saw a entertainment programme which also contained current affairs, one quarter could watch an NS promotion film (Railaway), and the final (control) group saw nothing but a dark screen.

Figure 8.4 Screens with infotainment

11 This study was presented at the European Transport Conference (Van Hagen, Pruyn, Galetzka & Kramer, 2009).

8.4.2 SUBJECTS

As in the second study, we used the NS customer panel (Appendix 1). Ultimately, 898 panel members participated in the experiment, of which 532 (58.8%) were male and 366 (41.2%) were female. The mean age of the respondents was 43 years (*SD* = 15.68, min. 13 years, max. 80 years).

8.4.3 MEASUREMENT INSTRUMENT

After navigating the virtual station and boarding the train, respondents had to fill in a questionnaire. The reliability analyses and findings of the first study did not warrant any major changes and/or addition of constructs (Table 8.8). Only the constructs used in the second study to measure the attitude to advertising were adapted to a scale that measured the attitude to the programming.
Two of the hypotheses from the second (advertisement) study will be tested. Owing to the outspoken support found in the second study for hypothesis 4, in which platform advertising was predicted to lead to greater approach behaviour, this variable was not measured in this study. Also hypothesis 2 could not be tested in this study because with infotainment the tempo of the screen change was not manipulated.

Table 8.8 Cronbach Alpha, Min., Max., M and SD of the dependent variables

	Infotainment study				
	α	*Min.*	*Max.*	*M*	*SD*
STATION EXPERIENCE					
Pleasure	.87	1	7	4.54	.97
Arousal	.75	1	7	4.78	1.12
Dominance	.73	1	7	4.21	.74
General appreciation environment	.88	1	7	4.52	1.23
Approach behaviour	.90	1	7	4.23	1.23
Platform score	–	1	10	6.92	1.26
WAITING EXPERIENCE					
Time perception platform	–	0	40	3:35	3:14
Acceptance waiting time	–	1	7	5.67	1.39
Cognitive time perception	–	1	7	4.47	1.80
Utilitarian waiting experience	.86	1	7	3.52	1.22
Hedonic waiting experience	.93	1	7	4.04	1.12

8.4.4 RESULTS STUDY 3

Infotainment and station evaluation

The majority of the experimental subjects (67.5%) indicated having seen the screens. On average they looked at them for 53 seconds. When there was no programming, a larger portion of the subjects (52.5%) admitted to not having seen the screens, as opposed to when there was programming (27.5%). This suggests that the moving images almost certainly attracted attention to the screens. Whether or not the screens were seen showed no effects for pleasure, arousal and dominance, but in Table 8.9 we can see that experimental subjects who admitted to having seen the screens awarded a higher platform score than those who had not seen a screen or who had only seen a dark screen ($F(1, 820) = 10.9$, $p = .001$). This implies that hypothesis 3 for infotainment can be confirmed.

Infotainment and waiting experience

Differences with infotainment were found with regard to the waiting experience (Table 8.9). Experimental subjects who noticed the screens and the infotainment felt that they had waited longer ($F(1, 840) = 50.01$, $p = .000$) than those who had not seen the screens. These results suggest that hypothesis 1b can be confirmed for the infotainment stimuli and would hence support the *contextual changes model* of time perception where more processed information results in a longer time experience. However, just as in the advertisement study, a closer analysis revealed that subjects who had seen the screens also spent a significantly longer time on the platform than those who had not seen them ($F(1, 845) = 24.82$, $p = .000$). Also apparent is that the time sense factor of experimental subjects who did see the infotainment was lower than those who did not see it ($F(1, 845) = 4.26$, $p = .039$), Table 8.9. This means that experimental subjects who saw infotainment, irrespective of the duration of the wait, assessed their wait as being shorter than those who did not see infotainment. As the experimental subjects not only awarded a higher score to the platform with infotainment but also assessed the wait as shorter, the *attentional model* would seem to apply here, i.e. passengers allow themselves to be distracted by the moving images, pay less attention to the time and are thus less inclined to overestimate its duration. This confirms hypothesis 1a.

Table 8.9 Means (SDs) score and waiting experience platform if infotainment was seen yes/no

	No infotainment seen	Infotainment seen
	M (SD)	*M (SD)*
Score platform	6.9 (1.3)	7.2 (1.1)**
Objective waiting time platform *(in minutes)*	3:58 (5:35)	5:50 (5:31)**
Cognitive waiting experience platform *(1 = short, 7 = long)*	2.92 (1.80)	3.81 (1.72)**
Time sense factor platform[12]	1.53 (1.79)	1.20 (2.28)*

Note: *Means with * and ** differ significantly in the row: ** $p < 0.001$, * $p < 0.05$*

12 TSF: Time Sense Factor = the subjective waiting time divided by the objective waiting time per experimental subject.

Appreciation of infotainment

Having asked the subjects (7-point Likert scale) what type of content they found the most suitable on the platforms, it appeared that NS-related (passenger) information was regarded as the best kind of content ($M = 6.32$, $SD = 1.15$), followed by entertainment ($M = 5.35$, $SD = 1.69$). Advertising and promotion were considered the least suitable ($M = 2.45$, $SD = 1.60$). An analysis of variance demonstrated that there was no connection between the kind of content seen and the assessment of the suitability of the different types. Other analyses showed that there were no main effects of type of content, although several interesting interaction effects were found.

Attitude towards the content

Lust passengers valued the informative content higher than must passengers ($F(1, 508) = 3.82$, $p = .05$, Figure 8.5 and Table 8.10).

Table 8.10 Means (SDs) of attitude towards the content

		No content	Railaway	Informative content	Entertainment
		M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Attitude towards the content	**Must**	4.19 (1.46)	3.93 (1.43)	3.71 (1.35)	4.29 (1.50)
	Lust	4.25 (1.25)	4.29 (1.28)#	4.11 (1.15)*	3.86 (1.38)#

Note: *Means with * and # differ significantly in the column: $*p < 0.05$, $^{\#}\ p < 0.1$.*

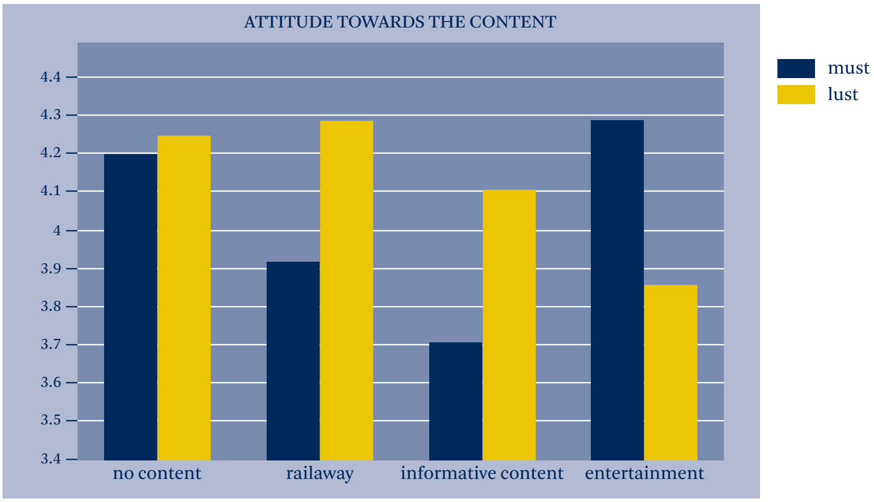


Figure 8.5 Interaction passenger type and content on attitude towards the content

Notably the entertainment content was valued higher by must than by lust passengers ($F(1, 508) = 3.34$, $p = .06$). Although marginally significant, we can see in

Figure 8.5 that lust passengers also value the Railaway content higher than must passengers ($F(1, 508) = 2.77$, $p = .09$, Table 8.10). There appeared to be no differences between lust and must passengers when no content was narrowcasted.

Perceived waiting time
An interaction effect was found with regard to density and type of content on the perceived waiting time ($F(3,881) = 2.55$, $p = .05$). When there was no content, the perceived waiting time was shorter on a low density than on a high density platform ($F(1, 881) = 7.96$, $p < .01$, Table 8.11).

Table 8.11 Means (SDs) of perceived waiting time

		No content	Railaway	Informative content	Entertainment
		M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Perceived waiting time	**Low density**	6:16 (3:54)	7:19 (5:10)	8:18 (5:48)	7:11 (5:46)
	High density	8:17 (5:38)*	7:46 (4:20)	7:53 (5:49)	6:56 (4:23)

Note: *Means with * differ significantly in the column: * p < 0.01.*

This difference did not appear to be significant for entertainment, informative and Railaway programming. This finding places hypothesis 1a in a remarkable perspective. Figure 8.6 demonstrates that distractors – particularly in the form of news and passenger info – can lead to a lower time estimation (in comparison with no programming), but that this occurs on busy (not on quiet) platforms. These findings suggest that the *attentional model* offers a suitable underpinning of platforms where much is going on: activity combined with distraction by infotainment.

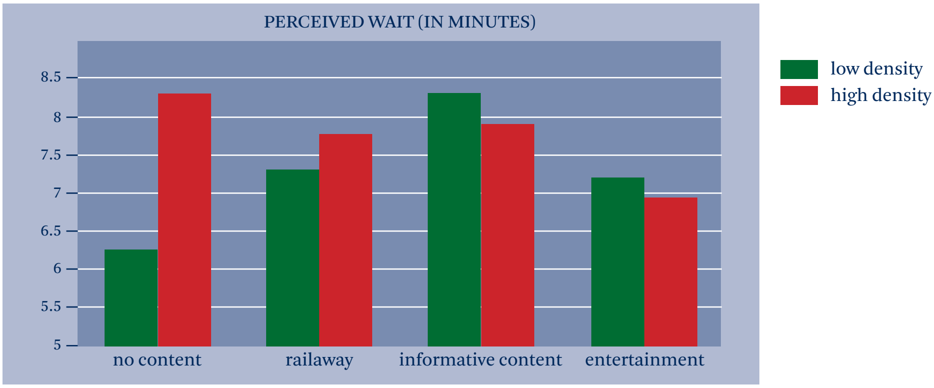


Figure 8.6 Interaction density and content on perceived waiting time (in minutes)

Dominance

No significant differences were found for pleasure and arousal, but an interaction effect of density and type of content was found on dominance ($F(3, 842) = 3.15$, $p = .03$, Figure 8.7). In the entertainment variant, greater control was experienced when the platform was busy than when it was quiet ($F(1, 842) = 5.87$, $p = .02$, Table 8.12).

Table 8.12 Means (SDs) of dominance

		No content	Railaway	Informative content	Entertainment
		M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Dominance	**Low density**	4.26 (.67)	4.26 (.67)	4.11 (.67)#	4.14 (.75)*
	High density	4.18 (.64)	4.17 (.62)	4.28 (.73)#	(.87)*

Note: *Means with * and # differ significantly in the column: * $p < 0.05$, # $p < 0.1$.*

This difference was marginally significant for informative content ($F(1, 842) = 2.99$, $p = .08$, Table 8.12) and did not appear to be significant in the conditions of no programming, informative and Railaway programming. The conclusion may thus be drawn that infotainment on a busy platform increases the sense of control.

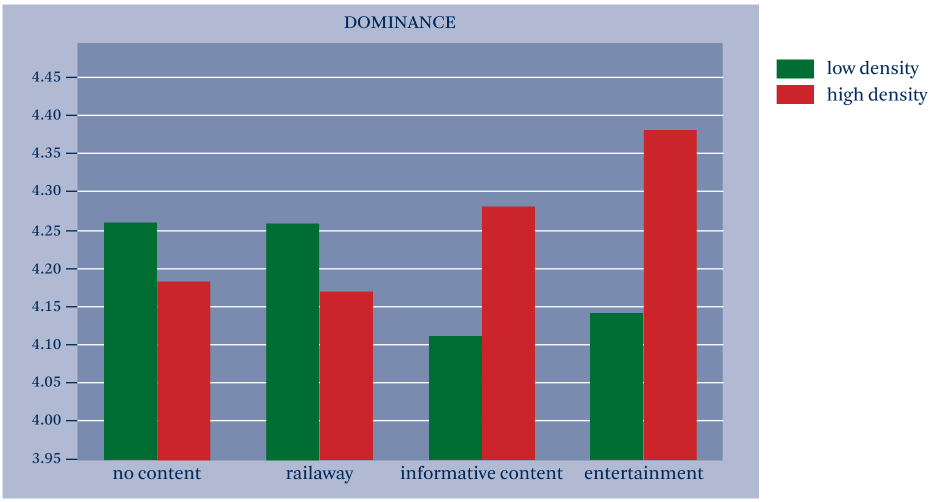


Figure 8.7 Interaction density and content on dominance

8.5 CONCLUSIONS

The pattern of results emerging from the three studies is quite subtle and in some cases even unexpected. Apparent from the field study was that in practice infotainment results in a positive evaluation of both station and waiting experience. Passengers awarded a higher score to the platform and found the wait with infotainment more pleasant and useful. Particularly when the platform was busy, infotainment yielded the most positive scores. It would seem that in the second study the appraisal of the platform wall advertising was negative, whereas positive behavioural effects did indeed occur as were also convincingly demonstrated by the possibilities to influence the time perception with the image tempo. True, experimental subjects made it known that they were not interested in advertising nor did they find platform advertising suitable, but they did allow themselves to be influenced by it nevertheless. The presence of platform wall advertising moreover produced positive affective reactions. Experimental subjects indicated enjoying themselves more during the wait and experiencing the waiting time as more useful and pleasant when platform wall advertising was present. These results suggest that one can consciously express a negative opinion of such forms of advertising (i.e. when explicitly asked), yet still affectively and unconsciously react to it in a positive way.

Passengers reacted with greater enthusiasm to infotainment on the platform screens (first and third study). In their opinion, infotainment offered a more positive contribution to the appearance of the station and actually led to more positive reactions and higher scores. Infotainment, moreover, seemed to be particularly noticed when passengers had a longer wait on the platform; in accordance with Zakay and Block's *attentional model* (1997), with infotainment providing them with a distraction from the waiting time, they were less inclined to overestimate its duration. This means that particularly with longer waiting times infotainment is a 'wait softener'.

8.5.1 DISCUSSION

A number of effects were found concerning the presence of the two kinds of platform distractors that are directly relevant if the decision is made to actually exploit (either of) them.

First it appeared that with platform wall advertising the screen change pace can be deployed to influence the perception and experience of waiting time. This finding makes platform wall advertising an excellent instrument to favourably improve the total servicescape without the passenger being aware per se of these positive effects (Van Hagen, Pruyn, Galetzka & Kramer, 2009).

On a quiet platform passengers experienced greater pleasure when the tempo of the platform wall advertising was slow. When the platform was busy, then it was the fast tempo that gave the greater pleasure. An explanation for this phenomenon may be found in the socio-psychological theories of '(in)congruence'. Congruence means that someone's needs, wishes and preferences correspond to or match the situation in which one finds oneself and this usually leads to greater satisfaction. Incongruence between need and situation, on the other hand, leads to people feeling less comfortable in that situation (Spokane, Meir & Catalano, 2000). It has also been shown (Van Rompay, Pruyn & Tieke, 2009), that (in)congruence between varying aspects of the design of products can result in a better (or worse) *processing fluency*, and hence to a more positive (or negative) assessment. In the case of passengers waiting on the platform, we suspect that congruence between the tempo (fast/slow) of the platform wall advertising and the environment (low/high density) positively affects the degree of pleasure because it enhances processing fluency. Incongruency (e.g. fast tempo of screen changes in combination with a quiet platform, or slow tempo in combination with a busy platform) is not highly valued by passengers, due to lower processing fluency, and the fact that it can create an information overload (Bolls, Darrel & Muehling, 2003; Lang, 2000). It is also possible that passengers in a busy environment with fast screen changes pay less attention to the content of the message (*information overload*), but instead are more receptive to the appeal of the images (Bolls, Darrel & Muehling, 2003; Lang, 2000). In this case infotainment in a busy environment functions sooner as an *ambient* than a *design* element. That none of the expected effects of infotainment on arousal were confirmed, makes it plausible that infotainment can be seen as an appealing distraction from waiting.

Infotainment leans more on the content that is narrowcasted. Lust passengers value the informative kind of content higher than must passengers. This is probably because lust passengers are less in a hurry and are thus more receptive to distraction and information. For must passengers the informative variant probably offers little extra information, which results in a lower assessment, whereas the entertainment variant with current affairs does have the content that must passengers value. Whatever the case, for the practical organization of the programming, these findings offer interesting leads: a segmented supply of the type of information during peak and off-peak hours. Lust passengers experience more dominance (perceived control) when it is quiet on the platform and must passengers when it is busy. Respondents were primed in the must and lust scenario and this probably also influenced their experience and expectations. A must passenger travels during peak hours and will therefore be accustomed to and expect a busy platform. A lust passenger, on the other hand, travels primarily during off-peak hours and thus expects a quiet platform. When the situation on the platform does not match expectation and experience, there is a lesser sense of control. Finally, many similarities were found between the field study and the virtual studies with regard to the platform score, pleasant wait and useful wait. Also apparent from both the field and the virtual studies was that the waiting time was overestimated and that infotainment was particularly positively valued in a busy situation. This suggests that research in a virtual environment is a reliable method for studying stations and waiting experience.

8.5.2 RECOMMENDATIONS

In conclusion we can state that the presence of platform wall advertising or screens with infotainment contributes positively to the waiting experience as both of them soften the wait and distract attention from the waiting time.
Seeing as with public transport the objective waiting time can often not be shortened and passengers spend the largest part of their wait on the platform, we recommend making the waiting environment and waiting conditions as pleasant as possible. Particularly the deployment of screens with infotainment (with well-considered programming and under optimal screen change conditions) would seem an interesting instrument to influence the perception of the wait.

CHAPTER 9

DISCUSSION AND RESEARCH RECOMMENDATIONS

'WHILE EMOTIONAL EVALUATION OF THE SERVICE ENVIRONMENT IS PRIMARILY A FUNCTION OF VARIOUS AMBIENT, DESIGN, AND SOCIAL FACTORS, EMOTIONAL RESPONSE TO THE WAIT IS A FUNCTION OF MANY ENVIRONMENTAL AND NON-ENVIRONMENTAL FACTORS SUCH AS THE SERVICE STAGE AT WHICH THE WAIT OCCURS AND WHETHER CONSUMERS KNOW IN ADVANCE HOW LONG THEY WILL HAVE TO WAIT.'

HUI, DUBÉ & CHEBAT, 1997


12:39

9.1 INTRODUCTION

This chapter will take a retrospective look at the findings of our studies and link the theories on the experience of both the wait and the environment as discussed in Chapters 3 and 4. With this PhD thesis having investigated how waiting experience can be positively influenced by making the environment in which it takes place more pleasant, it has become clear that as people do not possess a sense with which they can perceive time, time perception is a cognitive process (Block & Zakay, 1997). Although they can indeed perceive the environment with their senses, it is on the basis of events occurring in it that they estimate time. As visualized in Figure 9.1, the events and the environment moreover influence the affective perception of time. With the X-axis relating to the cognitive perception of time, such as the estimation of the duration (in minutes) and the experience thereof (short/long), the Y-axis defines the affective evaluation of the wait as environmentally influenced emotions, such as pleasure, arousal and dominance, but also emotions evoked by the wait, such as the affective appreciation of the waiting time, acceptance thereof and whether the waiting time was perceived as useful and pleasant (Hui, Dube & Chebat, 1997). The underlying principle of this chapter is the conceptual model elucidated in the *Introduction to the empirical studies* (Figure 9.3, Paragraph 9.5), and it is on the basis of this model that the findings of our studies will be discussed. First we will address the cognitive perception of time (the X-axis in Figure 9.1) and subsequently the affective evaluation of the wait (the Y-axis in Figure 9.1).

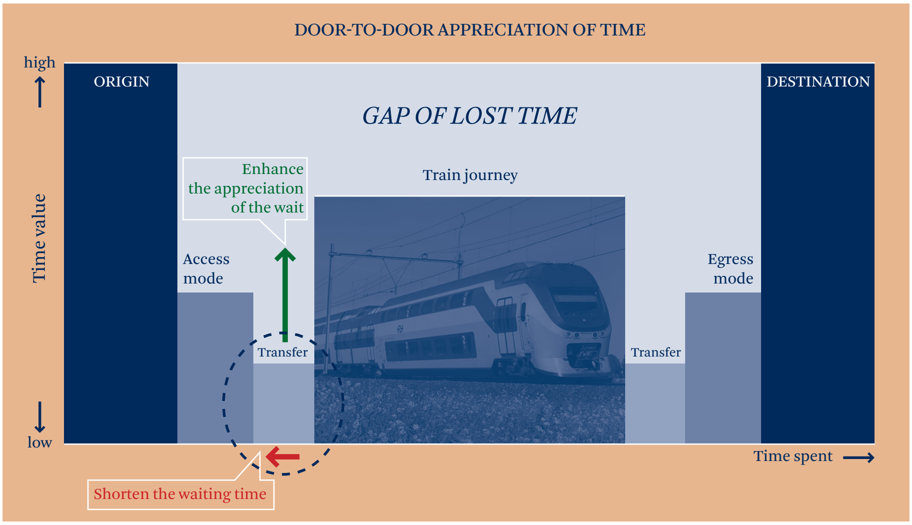


Figure 9.1 Two ways to influence waiting time: shorten the waiting time and enhance the appreciation of the wait

9.2 OBJECTIVE AND SUBJECTIVE TIME

Chapter 3 revealed how people often overestimate the duration of their wait (Flaherty, 1999; Hornik, 1984; Maister, 1985; Larson, 1987; Zakay & Block, 1997), and the studies in this thesis have determined that this also holds for the station environment. For several of these studies Table 9.1 shows the objective waiting times and the time sense factor (TSF)[13] of the station and the platform. The data originate from the field study of waiting time at stations (Chapter 5) and four virtual online studies (Chapters 6, 7 & 8). Table 9.1 illustrates that the average objective stay at the station was just over seven minutes both in the field study and in the online studies, which indicates that the wait in the virtual world was successfully simulated. Passengers moreover appeared to wait five minutes on the platform and overestimated the duration of the wait. This concurs with findings in the literature (Block, 2006; Hornik, 1984; 1992; 1993; Katz, Larson & Larson, 1991; Block, Zakay & Hancock, 1998). The overestimation of the waiting time on the platform also appeared to vary between 30% in the infotainment study (TSF = 1.30) and 95% in the field study on waiting time (TSF = 1.95). Considering the gross overestimation of the waiting time in the field study, it is plausible that waiting in a real-life situation is more vehemently undergone than in a virtual one (where passengers are also inclined to amply overestimate the wait).

Table 9.1 Means objective waiting time and TSF of station/platform and waiting time share platform

Studies	**Field study**	**Online studies**			
	Waiting time (H5)	**Colour (H6)**	**Music (H7)**	**Advertising (H8)**	**Infotainment (H8)**
M* time at station	7:07	7:09	7:05	7:17	7:22
TSF station	1.90	1.17	1.10	1.26	1.29
M* time on platform	4:56	3:54	4:05	5:06	4:52
TSF platform	1.95	1.85	1.51	1.57	1.30
% time on platform	69%	55%	58%	70%	66%

** = Objective waiting time in minutes and seconds.*
TSF: Time Sense Factor = the subjective waiting time divided by the objective waiting time per experimental subject.

13 TSF: Time Sense Factor = the subjective waiting time divided by the objective waiting time per experimental subject.

9.3 ATTENTION AND TIME

The *attentional model* presupposes that people who pay attention to the time will also be able to estimate it more accurately (Block, 2006; Zakay, 1989; Zakay & Block, 1997). In order to test whether paying attention to time influences the perception and experience thereof, the four online studies included questions on time awareness (e.g. "*When you were on the platform did you look at the clock?*") and the affective experience of time (Pruyn & Smidts, 1998)[14].
Table 9.2 illustrates the average waiting time on the platform of passengers who kept an eye on the clock (and who were thus consciously aware of the time) and passengers who did not. It appeared that the first group waited on average longer on the platform than the latter group (i.e. those who did not heed the time). Apparently, a longer objective waiting time results in passengers becoming more aware of the time and thus their paying attention to it. If we look at the TSF (time sense factor), we can see that passengers who did not heed the time overestimated their time spent on the platform with a factor of almost 2.5 on average (Table 9.2). These findings concur with earlier research (Katz, Larson & Larson, 1991; Larson, 1987; Maister, 1985; Pruyn & Smidts, 1998). In accordance with the *attentional (gate) model*, the results in Table 9.2. make a reasonable case for dividing one's attention between time- and non-time-bound activities (Zakay & Block, 1997). With longer waiting times passengers start to pay attention to the clock (Pruyn & Smidts, 1998), the *gate* opens and time then seems to go more slowly and can be more easily estimated (Zakay, 1989, Zakay & Block, 1997). What is striking is that passengers who (as good as) ignore the time, and who are thus less occupied with the wait, actually grossly overestimate its duration. One explanation may be offered by *Vierordt's Law* (Lejeune & Wearden, 2009), whereby short durations are overestimated and long durations are underestimated. It is possible that experimental subjects who ignore the time indeed overestimate a relatively short wait because they find themselves in a waiting situation in which time usually seems to pass more slowly (Flaherty, 1999; Hornik, 1984; 1993; Larson, 1987; Moreau, 1992). The conclusion may be drawn that people can only estimate the time accurately when they consciously pay attention to it.
As not all passengers have to wait the same length of time, it was interesting to find out if the attention to time also influenced the cognitive and affective time perception irrespective of the objective waiting time. That is why MANOVAs were carried out for the four online studies, whereby *did/did not heed the time* were independent variables and the *time experience on the platform* and the *affective wait evaluation on the platform* were dependent variables, with *objective time on the platform* included as co-variate (Appendix 5 for the values).

14 *Affective evaluation of the waiting time* was measured with 4 items based on a study by Pruyn and Smidts (1998) on waiting time. Examples of items: 'I was annoyed because of the time I had to wait' and 'I felt bored during the waiting time' (*1 = totally disagree, 7 = totally agree*; coefficient alpha = .78).

Table 9.2 Means (SDs) from four online studies on time experience

	Colour online	Music online	Advertising online	Infotainment online
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
OBJECTIVE PLATFORM TIME (MINUTES & SECONDS)				
Heeded time	4:44 (2:43)	4:55 (3:10)	5:35 (4:14)	5:35 (5:03)
Did not heed time	2:06 (2:25)**	2:09 (2:50)**	2:59 (5:38)**	2:59 (5:44)**
TIME SENSE FACTOR (TSF) PLATFORM				
Heeded time	1.33 (2.12)	1.11 (1.26)	1.09 (1.05)	1.17 (2.16)
Did not heed time	2.93 (4.94)**	2.58 (7.90)**	2.01 (2.53)**	1.68 (1.95)**
TIME EXPERIENCE PLATFORM *(1 = short, 7 = long)*[1]				
Heeded time	3.93 (1.72)	3.85 (1.67)	4.15 (1.76)	3.90 (1.75)
Did not heed time	2.60 (1.64)**	2.72 (1.64)**	2.46 (1.60)**	2.54 (1.61)**
AFFECTIVE WAIT EVALUATION PLATFORM *(1 = low, 7 = high)*				
Heeded time	4.50 (1.30)	4.01 (1.63)	4.15 (.58)	4.83 (1.16)
Did not heed time	5.17 (1.27)**	5.01 (1.59)**	4.32 (.55)*	5.37 (1.24)**

*Differences between heeded time and did not heed time, ** = $p < 0.05$, * = $p < 0.1$,*
[1] = corrected (co-variate) for objective waiting time platform.

The analyses of each study show that passengers who heeded the time found the wait longer – irrespective of its duration – and that their affective wait evaluation was more negative in comparison with those who did not heed the time (Table 9.2). Again the findings can be explained with the *attentional model*: passengers who heed the time think that it passes more slowly and is more boring (Zakay & Block, 1997). The results can also be explained with *reversal theory* (Apter, 2007): passengers who heed the time are more occupied with the travel process, are more serious, concentrated, stressed (*telic*) and less receptive to environmental stimuli (Apter, 2007; Easterbrook, 1959; Gilboa & Rafaeli, 2003). In contrast, passengers who do not heed the time are less hurried, less fixed on the travel process (*paratelic*), are more receptive to environmental stimuli and thus react more positively to their stay at the station.

Pruyn and Smidts (1998) concluded in their study on the waiting experience in hospitals that enquiring after the cognitive time experience (short/long) and the affective time experience appeared to be a better predictor of customer satisfaction than an estimation in minutes. Our findings would seem to corroborate that this also applies to stations.

9.4 ENVIRONMENTAL STIMULI AND TIME PERCEPTION

The studies in this thesis demonstrate that waiting time sometimes seems to pass more quickly in an environment with few stimuli as well as in an environment with many. In the colour and light studies, time seemed to pass more quickly with the barely stimulating colour blue and dimmed lighting (Chapter 6), whereas in the music and infotainment studies time appeared to pass more quickly with stimulating music and fast screen changes on a busy platform (Chapters 7 and 8). Several explanations may be given for these (apparently) opposite results. For example, we know that conscious attention plays a role when estimating time (Block, 2006; Ornstein, 1969; Poynter, 1983; Thomas & Weaver, 1971; Weick & Guinote, 2010; Zakay, 1989; Zakay & Block, 1997). Zakay and Block (1997) concluded that the various (pro- or retrospective) research methods determine what holds people's attention, namely the time or other activities (Chapter 3; Block & Zakay, 1997; Zakay & Block, 1997). Conscious attention to the time also played a role in our studies, albeit that any contrast was determined by the kind of environmental stimuli. Although every stimulus in the environment is perceived and influences our behaviour, selective selection allows only few to reach our consciousness (Dijksterhuis, 2007; Gladwell, 2005; Lin, 2004; Mieras, 2007; Wegner, 2002; Wilson, 2002). When environmental stimuli are barely consciously perceived (such as cool colours and a low level of lighting, Paragraph 9.6), one's attention is not consciously distracted from the time. However, a more stimulating environment (warm colours, high level of lighting) does afford more information processing (Belizzi & Hite, 1992; Belizzi, Crowley & Hasty, 1983). Ornstein's *storage size model* (1969) might offer an explanation here, comparable as it is to the retrospective approach in which more information processing results in a longer estimation of the duration.
When attention is consciously distracted from the time, such as with music, advertising and infotainment, passengers notice their environment more and can even experience a moment of 'flow' (Csikszentmhalyi, 1999; Lotz, Eastlick, Mishra, & Shim, 2010). As less *processing capacity* remains to follow the time, it seems to pass more quickly. Here, in accordance with the *attentional model*, and as with the prospective approach, distraction from the time affords a shorter estimation of the duration (Block, 2006; Zakay, 1989; Zakay & Block, 1997).
Although Apter's reversal theory (2007) paid no attention to the experience of time, it might still explain our findings. Both few and many stimuli can afford a higher hedonic tone in the shape of relaxation (few stimuli) or pleasure (many stimuli) and make time seemingly pass more quickly (Baker & Cameron, 1996). Our studies have shown that the experimental subjects indeed experienced greater pleasure not only with dimmed lighting but also with stimulating music, advertising and infotainment.
Combining aforementioned explanations implies that as satisfied passengers do not pay attention to the time, it seems to pass more quickly (*attentional model*, Zakay

& Block, 1997). Relaxed passengers neither (consciously) heed the time nor their surroundings and are probably so deep in thought that they also estimate the time as shorter (*storage size model*, Ornstein, 1969). Figure 9.2 visualizes the relationship between hedonic tone, attention and waiting experience. It also clearly demonstrates that passengers with an extremely low hedonic tone grossly overestimate the time because they are bored due to a long wait (*ironic monitor/assimilation theory)* or because the wait itself induces stress (*stress management theory,* Paragraph 4.9).

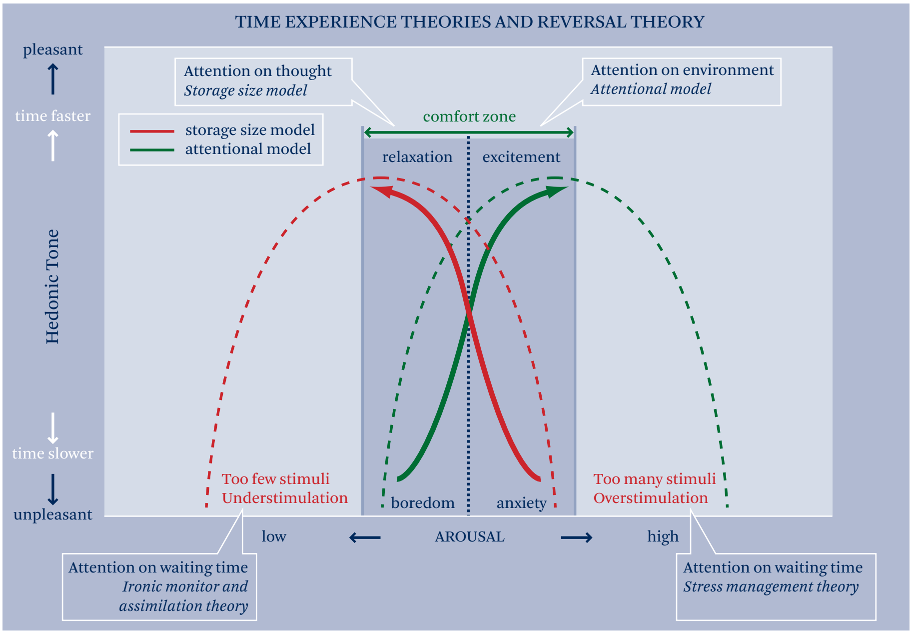


Figure 9.2 Relationship research findings and theories on waiting time

9.5 STATION EXPERIENCE AND AFFECTIVE EXPERIENCE OF TIME

We have just looked at the cognitive component of waiting time and seen how objective time is perceived. We have also seen that environmental stimuli influence cognitive time perception and that a role is played by the affective evaluation of the environment. Various researchers have ascertained that approach behaviour is not just influenced by the cognitive but particularly by the affective component of waiting (Cameron, Baker, Peterson & Braunsberger, 2001; Hui, Dube & Chebat 1997; Pruyn & Smidts, 1998). That is why this thesis also investigated how environmental stimuli can influence the affective evaluation of the wait. The conceptual model addressed in the *Introduction to the experimental studies* (Figure 9.3) serves as a guide to the rest of this chapter. Each paragraph focuses on one of the elements in the conceptual model and includes a discussion of the findings of the various studies. First the environmental manipulations will be addressed, then the affective reactions (arousal, dominance, pleasure and affective waiting experience) and the effect they have on the station and waiting evaluation.

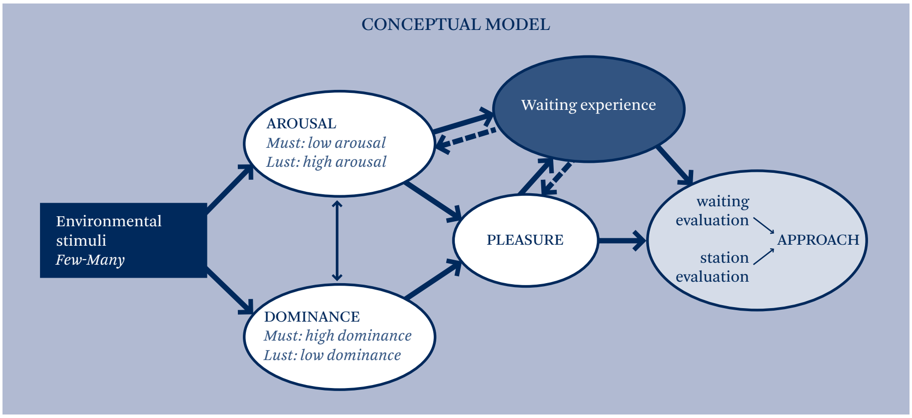


Figure 9.3 Conceptual model for the various studies

9.6 PERCEPTION OF THE ENVIRONMENT

The objective of this thesis was to discover the degree to which a pleasant and distracting environment can contribute to a more positive station and waiting experience for passengers awaiting their train. To this end, use was made of such models from environmental psychology as created by Bitner (1992) and Baker (1986). In various experiments manipulations were operationalized with Baker's three environmental dimensions: *ambient, design* and *social*.
The *ambient* dimension was manipulated in this thesis with music and light intensity. The *design* dimension was manipulated on the platform by altering the roofing with various colours and showing advertising and infotainment, and the *social* dimension was manipulated with the degree of platform density.
Although passengers continuously perceive stimuli in their environment, their perception is subject to selective attention which means that they do not perceive everything consciously (Lin, 2004). Particularly the *ambient* environmental elements, such as temperature, music and light, are mostly perceived unconsciously. Only when absent or unpleasant, such as a temperature that is too high/low or an environment that is too busy/quiet, are these elements salient (Bitner, 1992; Baker, 1986; Baker & Cameron, 1996).

The results of the environmental manipulations show that the surroundings in the various studies were indeed partly unconsciously perceived. Whereas less tangible elements such as colour and light intensity were less consciously perceived, the experimental subjects did notice the more striking stimuli, such as infotainment, sooner (Bitner, 1992; Baker & Cameron, 1996). With regard to the studies in Chapters 6, 7 and 8, Table 9.3 illustrates how many people consciously perceived the environmental manipulations.

Table 9.3 Percentage experimental subjects who consciously perceived the stimulus on the platform

Manipulation*	Field Study	Virtual lab Study	Online Study
Music 1	9%		
Music 2	10%		
Music 3			58%
Colour & Light 1	22%		
Colour & Light 2		27%	
Colour & Light 3			33%
Infotainment 1	65%		
Infotainment 2			62%
Infotainment 3			72%

** = Order of the studies is in accordance with the content of Chapters 6, 7 and 8.*

What is remarkable is that music in the field study was hardly consciously perceived at all, whereas in the online study it was noticed by the majority of the experimental subjects. In a pilot study on music (Appendix 2), 42% of the experimental subjects heard the music in the physical station, which would seem to suggest that the volume in the field study of Chapter 7 was lower, and thus less audible.
On comparing the insights with the classification of the servicescape as formulated by Baker (1986), one can see that as colour is so evidently visible, she groups it with the design elements. Despite the findings of our colour and light studies indeed showing the evident visibility of colour is, that is not to say it is always consciously perceived. In this respect colour should sooner be allocated to the less conspicuous *ambient* dimension than the more conspicuous *design* dimension.
It has been established in the various studies of this thesis that the stimuli evoke both cognitive and affective reactions but the apparent general antithesis between them is striking. For example, experimental subjects indicated a preference for no music or advertising on the platform, yet the music study demonstrates how the right music in the right context resulted in a more positive waiting experience just as the advertising study shows that advertising not only initiated greater pleasure and approach behaviour but also that the affective wait was more positively evaluated with advertising than without. Moreover, experimental subjects in the colour and

light studies indicated a preference for the colour blue and a high light intensity on the platform yet the same studies also show that the affective evaluation was not influenced by the colour preference or the colour one thought to have seen, nor the preference for the light intensity. Experimental subjects thus judged the environment with the low light intensity, both in the field and the online study, as the most positive and perceived a shorter wait with a low than with a high level of lighting. Apparently, people's cognitive assessment of certain matters is at odds with their affective experience. In accordance with the SOR model, it is however the affective experience that determines how people feel and how they evaluate the service.
The findings are in keeping with socio-psychological research demonstrating that conscious perception is not a prerequisite for the evaluation of a service (Dijksterhuis, Smith, Van Baaren & Wigboldus, 2005).

9.7 AROUSAL

Apter (2007) poses that it is the desired and not the experienced level of arousal that determines how people feel: *'Both bored and excited indicate a preference for high arousal whether or not it is being experienced, and anxious and relaxed likewise both imply a preference for low arousal'* (Apter, 2007, p. 48). This might explain why effects were not found for arousal in all the studies (Paragraph 9.10). In the virtual music study it appeared that stimulating music evoked more arousal than calming music, albeit only when the platform was busy. In the field study of colour and light it appeared that colour combined with a high light intensity afforded more arousal and in the online colour and light study it appeared that the warm colour yellow had a particularly stimulating effect on lust passengers. No results for arousal were found in the infotainment study.
It can be concluded that although the results point in the predicted direction, passengers did not become overly stimulated in terms of arousal. One explanation might be that arousal knows two levels of stimulation: an intense one and a more controlled one. Apter (2007) posed that sleepy/wide-awake is a totally different form of arousal than boredom/excitement or anxiety/relaxation. In their investigation into layout and signing in various bank environments, Ang and Leong (1997) demonstrated that there are indeed two kinds of arousal: a more passive and a more active form (Ang, Leong & Lim, 1997; Leong, Ang, & Low 1997). As a station is a functional public space in which people usually show more self-control than in a private or hedonistic environment, they are more likely to experience a passive form of arousal. Arousal can thus be better interpreted as information processing, whereby little results in boredom and complex information processing leads to stress. Too much information can result in a *mental overload* (Easterbrook, 1959; Huffman & Khan, 1998; Klapp, 1986; Lang, 2000; Milgram, 1970; Saegert, 1973; Smith, 1961), which lowers the hedonic tone. Understimulation, on the other hand,

can lead to boredom (*mental underload*), which also lowers the hedonic tone. Hence arousal does influence pleasure but more via mentally processing the number of environmental stimuli than via physically influencing the organism (Furnham & Allass, 1998; Oakes, 2000; Oakes & North, 2008). The differentiation between passive and active arousal can also successfully explain why time passes more slowly in an environment in which passengers have to suppress their emotions (*extended now*, Vohs & Schmeichel, 2003; Paragraphs 3.7 and 9.4).

9.8 DOMINANCE

It appeared from the Delphi study (Chapter 2) that – particularly with the more functional services – a sense of control is important to consumers. A station environment is such a functional area, with passengers oriented on catching their train and thus setting great store by their control over time and space. A sense of control over the space demands a clear overview and correct signing, whereas a sense of control over the time requires accessibility to the correct time and real-time travel information.

The findings of the field study with music show that dominance played an important role when music was played at a station, i.e. passengers experienced greater control on a quiet platform with music than without. The sense of control thus plays a mediating role in the station evaluation. Apparent from the findings of the online study on colour and light was that greater control (dominance) was experienced with a low light intensity than with a high one, just as the field study on colour and light demonstrated that a low light intensity combined with colour initiated greater dominance than without colour. It can be concluded that in an environment with few stimuli (quiet platform, little light) a greater sense of control can be experienced by adding extra stimuli (music, colour). One explanation might be that passengers experience greater control with an optimal level of stimuli, enabling them to remain in their comfort zone and feel less lost. This is in keeping with *optimal arousal theory* (Apter, 2007; Hebb, 1955), whereby the *hedonic tone* is higher with an optimal number of stimuli. Massara, Liu and Melara (2010) consider dominance as a 'processing emotion', which together with arousal determines the level of pleasure which Messara and collegues regard more as an 'output emotion'. In this respect, dominance, like pleasure and platform score, can be seen as a component of the *hedonic tone*.

The results of the advertising study show that the experimental subjects experienced less control with advertising than without, although they did experience greater pleasure and approach behaviour. Also apparent from the findings of the infotainment study is that passengers experienced greater control when viewing news bulletins on a busy platform and that must passengers were more receptive to news programmes than any other type. One explanation for this might be that passengers in a busy environment are more concentrated and alert to achieving their goal and receptive to informative content. The number of stimuli might be optimal for the experienced pleasure but too great for the sense of control. The findings give the impression that advertising and infotainment are positively embraced as distraction, but for a positive sense of control the content must fit the passengers' current objective (Bolls, Darral & Muehling, 2003). *Congruency* and *processing fluency* (Van Rompay & Pruyn, in press) could offer some explanation for these results: must passengers particularly value short, informative programmes, and the busier the platform, the faster the screen change should be. Density and fast screen changes afford congruent visual stimuli, enabling an optimal *processing fluency* to be reached and costing the least mental energy (Osuna, 1985).

9.9 PLEASURE

This paragraph will address our findings for the studies on pleasure on the platform and Figure 9.3 illustrates how pleasure is influenced by arousal and dominance. The results of the online music study reveal that pleasure was positively influenced by the number of stimuli. At quiet moments passengers experienced greater pleasure when not calming but stimulating music was played, whereas at busy moments it was the other way round. These findings concur with those of Eroglu, Machleit and Chebat (2005). From the results of the online colour and light study it appeared that – regardless of the light intensity – lust passengers experienced greater pleasure with the (more stimulating) warm colours red and yellow. In contrast, must passengers leant more towards the colour blue. In the field study on colour and light the colours on the platform not only appeared to be experienced as more stimulating, colourful and warm but together with a low light intensity also initiated a more positive station evaluation. Although few differences were found between peak and off-peak, it appeared that passengers appreciated colour even during peak hours. Apparently there are so few stimuli on the platform that extra colour will be positively assessed.
Finally the advertising study revealed that passengers experienced greater pleasure with advertising than without. Also the slowly changing advertising images on a quiet platform and the faster change on a busy platform afforded greater pleasure. These findings concur with those of Massara, Liu and Melara (2010), and can be successfully explained with *reversal theory*. It became evident that stimulating music, warm colours and advertising at quiet moments result in greater pleasure than calming music, cool colours and no advertising.

9.10 WAITING EXPERIENCE

The conceptual model (Figure 9.3) showed that pleasure and arousal influenced the waiting experience (Paragraph 9.4), but also that the waiting experience itself can influence pleasure and arousal. When people have to wait for a long time, they experience less pleasure and become more irritated than those whose wait is short (Larson, 1987; Maister, 1985). In Paragraph 9.3 we saw that passengers are not very successful when it comes to estimating time and that – irrespective of the objective waiting time – it is predominantly the perception whether one's wait has been short or long that influences the affective waiting experience (Table 9.2). In order to ascertain whether a long or short wait influences other variables of the conceptual model, such as pleasure and arousal (Figure 9.3), we conducted various analyses on the online studies on colour, music and infotainment (Chapters 6, 7 and 8). A correlation analysis was performed for the variable 'long-short' and *pleasure, arousal, dominance, score platform, utilitarian* and *hedonic wait appreciation* (Table 9.4). The results show that passengers who felt that their wait was short awarded the platform a higher score in all of the studies, as well as experiencing greater pleasure and finding the wait more useful and enjoyable than passengers who felt that their wait had been long (Table 9.4). In the online colour study and the infotainment study passengers who felt their wait was short experienced greater dominance than those who felt their wait was long (in the music study this difference in dominance was not significant). So, the longer the wait is experienced, the more negative the sense of control is.

For arousal the results vary. From the online colour study it appeared that the experimental subjects experienced greater arousal when their wait was short, but in the music and infotainment study they felt greater arousal when their wait was long. Music and infotainment might afford more distraction than a coloured roof, and also greater arousal. Also the findings of the field study on waiting experience at station (Chapter 5) showed that delayed passengers felt stronger emotions and awarded the station a lower score than those who had left on time. It seems plausible then that passengers who unexpectedly have to wait longer become irritated and thus experience more arousal and a lower hedonic tone. The conclusion may be drawn that the waiting experience, as posited in the conceptual model (Figure 9.3), has an influence on the evaluating variables (score platform, useful and pleasant wait) and that there is a reciprocal relationship between waiting experience and arousal and pleasure. The findings also showed reciprocity between waiting experience and dominance in the online colour and infotainment study, though not in the music study. Maybe the passengers' attention was distracted from their travel process more by the auditive music stimuli than the visual environmental variables (colour and infotainment).

Table 9.4 Correlations between short/long wait for pleasure, arousal, dominance, platform score, utilitarian and hedonic wait

Online studies		M, (SD) N	Pleasure	Arousal	Dominance	Platform score	Utilitarian wait	Hedonic wait
Colour	Short/ long wait	3.4, (1.8) *1319*	-.49**	-.38**	-.21**	-.27**	-.36**	-.41**
Music	Short/ long wait	3.5, (1.7) *517*	-.36**	.23**	-.06	-.19**	-.33**	-.35**
Infotainment	Short/ long wait	3.5, (1.8) *884*	-.48**	.22**	-.08*	-.15**	-.38**	-.38**
Colour	*M (SD)* *N*		4.5, (1.1) *1323*	4.5, (.89) *1315*	4.3, (.74) *1315*	6.8, (1.3) *1315*	3.5, (1.1) *1317*	4.0, (1.0) *1316*
Music	*M (SD)* *N*		4.4, (.9) *514*	3.5, (.9) *515*	3.9, (.8) *510*	6.8, (1.4) *515*	3.0, (1.4) *499*	3.9, (1.2) *498*
Infotainment	*M (SD)* *N*		4.5, (1.0) *875*	3.5, (1.0) *881*	4.2, (.7) *850*	7.1, (1.2) *862*	3.5, (1.2) *878*	4.1, (1.1) *871*

*** = Pearson Correlation is significant at the 0.001 level (2-tailed).*
** = Pearson Correlation is significant at the 0.05 level (2-tailed).*

9.11 STATION EVALUATION

Various environmental manipulations influence the station evaluation (Figure 9.3) via pleasure and waiting experience, as expressed in a higher score. It appeared from both the field and the virtual studies on infotainment, that passengers awarded a platform a higher score when it showed infotainment than one that did not. The results of both the field and the virtual study on music revealed a higher score being given to a quiet platform when up-tempo or stimulating music was played, but at busy moments it was the platform without music that scored the highest. The findings of the field study with colour and light revealed that a higher score was awarded to a busy platform combined with a low light intensity. In contrast, the online colour and light study showed that lust passengers on a quiet platform gave a higher score to a platform with the warm colours red and yellow, whereas must passengers on a quiet platform awarded a higher score with the cool colour blue. The positive influence of the various measures, as expressed in a score, amounts to over half a point per measure[15]. The results show that the most positive evaluation is created when the number of stimuli is in keeping with the passenger's goal-directedness and the situation (such as how busy it is). What is striking about the results is that for the less conspicuous variables, such as colour, light and music, incongruent environmental stimuli led to a more positive station experience. This complies with *reversal theory* in which *mildly incongruent* environmental stimuli

15 E.g. platform score field **colour** study: 6.6 with and 5.5 without colour; field **infotainment** study 7.0 with and 6.2 without; online **music** study station score 7.5 with and 6.8 without.

are key (Apter, 2007; Eroglu, Machleit & Chebat, 2005; Massara, Liu & Melara, 2010; Walters, Apter & Svebak, 1982).
However, the results of the advertising and infotainment study, whereby the most positive evaluation resulted from fast screen changes in a busy environment, do not tally with *reversal theory*. This discrepancy might be due to the fact that there is a difference between the processing of auditive and visual stimuli. Perceiving the environment demands mental energy and the more congruent it is perceived by all the senses (fast images, busy surroundings), the less information capacity is required. It is possible that with visual stimuli the human mechanism strives for congruent visual input, with an optimal *processing fluency*, so that as little energy as possible needs to be spent on perceiving the environment (Hui, Dube & Chebat, 1997; Osuna, 1985). A visually barely stimulating environment embraces auditive stimuli, whereas in a visually stimulating one, the extra auditive stimuli (e.g. music, which all but supports the task) afford too much arousal which can lead to a *mental overload* and a more negative station evaluation (Bruins & Barber, 2008; Lang, 2000).

9.12 WAIT EVALUATION

Our findings show that the environmental manipulations also influenced the utilitarian and hedonic waiting experience, i.e. whether people found their wait useful or pleasant. We have seen that people who found their wait on the platform short also found the time more useful and pleasant (Table 9.4). Also apparent from the online music study was that lust passengers preferred waiting on a quiet platform with stimulating music but preferred calming music when waiting on a busy platform. From the online colour and light study it appeared that must passengers preferred waiting on a blue platform and lust passengers on a yellow one. These results of the hedonic waiting appreciation thus support *reversal theory* (Apter, 2007; Walters, Apter & Svebak, 1982). Furthermore, from the colour and light field study it appeared that colours on the platform softened the wait and that waiting on a platform with colour and dimmed lighting enhanced both the usefulness and the pleasantness of the wait. Finally, the advertising study revealed that passengers found waiting on a platform with advertising more useful than without. In a similar vein, also the infotainment field study showed that passengers found their wait more useful and pleasant with infotainment than without. Apparently they experienced the platform as boring and bland, particularly at quiet moments. The conclusion can be drawn that when a platform is quiet, the wait is more useful and agreeable to passengers when environmental stimuli are added in the shape of music, advertising and infotainment, as well as coloured light combined with dimmed lighting.

9.13 CONCLUSION

In the studies we have seen that passengers spend most of their time waiting on the platform (Table 9.1) and that those who keep an eye on the time are reasonably successful in estimating the duration but find the wait longer and more tedious (Table 9.2). Passengers with a short wait award a higher score to the platform, experience greater pleasure and find the wait more useful and pleasant (Table 9.4). The conclusion may be drawn that the duration of the wait and the degree of environmental stimulation influence the waiting experience, which is shortened by both a shorter wait and a higher hedonic tone (relaxed, pleasant). A shorter waiting experience on the platform can be explained with the *attentional model* for environmental stimuli that consciously distract one from the time (music and infotainment) and with the *storage size/segmentation model* for environmental stimuli that are unconsciously perceived (colour and light).
It appeared from the Delphi study of the role of waiting experience among Dutch service providers that managers and other professionals have woken up to the importance of their customers' sense of control and desire for pleasant surroundings. What is remarkable, however, is that not one of these experts names the level of environmental stimulation as a focus of their attention, despite the studies having shown that the degree of stimulation is the key factor in the waiting experience. The studies in this thesis have demonstrated that the degree of stimulation particularly depends on the mental processing of the number of stimuli and that it can enable passengers to instinctively remain in their comfort zone. The level of stimulation is crucial to the experienced pleasure, dominance and the waiting experience, just as the correct number of stimuli influences the *processing fluency* whereby the surroundings must support the customer's objective. Our results furthermore support *reversal theory*, whereby *mildly incongruent* stimuli afford the most positive station evaluation and waiting experience. For example, our environmental manipulations have clearly shown that not only did cool colours make all passengers feel that their wait had been shorter but that with cool colours must passengers also more positively experienced the platform. Lust passengers, on the other hand, experienced the platform more positively with warm colours and a low light intensity; they then felt greater pleasure and found the wait more agreeable and useful. Stimulating music on a quiet platform afforded more pleasure, dominance, a higher score and a more agreeable wait. The opposite was the case on a busy platform. Platform infotainment, finally, afforded more pleasure, a higher score, greater approach behaviour and the wait was experienced as being more useful. Also fast screen changes on a busy platform gave greater pleasure and the wait seemed to last shorter. Furthermore we saw that different environmental stimuli influenced one another. The combination of colour and light, for example, led to other results than when only the light intensity or the colour's wavelength was altered. The same applied to playing different musical genres in combination with

the degree of platform density – the last mentioned playing a particularly large role with any kind of manipulation, whether that be colour, light, music, advertising or infotainment. From this we can deduce how notably modifying the degree of density is on the cognitive and affective waiting experience. When influencing the extent of stimulation of the other environmental dimensions (*design* and *ambient),* the number of passengers on the platform must therefore expressly be taken into consideration. Too many stimuli on a busy platform has a counterproductive effect on the station and waiting experience, and the same applies to too few stimuli on a quiet platform. The exception is advertising and infotainment, both being judged more positively on a busy platform than on a quiet one.

The conclusion may be drawn that, in accordance with the conceptual model (Figure 9.3), environmental stimuli influence the *processing emotions* arousal and dominance, which in turn influence the *output emotion* pleasure (Massara, Liu & Melara, 2010). Pleasure and arousal then influence the waiting experience, which together with pleasure influences the evaluation of both station and waiting time (Figure 9.3).

With regard to the servicescape, it can be observed that Bitner (1992) distinguishes in her model between ambient, functional and social components, whereas Baker (1986) classes hers into ambient, design and social elements. The findings of our studies demonstrate that it is not so much the arrangement in social, functional, design or ambient factors that plays a role in the station and waiting experience, but the degree to which the environmental characteristics are consciously or unconsciously perceived. Light intensity (*ambient*) and colour (*design*) are barely perceived consciously, whereas music (*ambient*) and infotainment (*design*) draw people's attention much faster. By differentiating between consciously and less consciously perceived environmental elements, people's attention can be steered in a desired direction. So, colour and light intensity can be deployed to positively influence the atmosphere of the waiting area and music and infotainment can be deployed to offer people distraction from their wait.

9.14 EMPLOYED RESEARCH METHODS

The experiments in this thesis were carried out as field studies and in a virtual world. Both methods have advantages and disadvantages that may influence the interpretation of the results. From a practical perspective the choice was made to always conduct a field study prior to the experiments with colour and light, music and infotainment in the virtual world. If the desired effects were found in practice, they formed the basis for the studies in the virtual world where more diverse conditions could be tested. The advantage of a field study is that it is immediately clear if a certain environmental manipulation actually works in practice. The disadvantage of a practical experiment, however, is that it is laborious, costs a lot of time and

money and that not all conditions can be kept constant. The results, for example, might be undesirably influenced by delayed trains, poor information provisions and ambient noise.
In order to rule out the influence of irregularities, studies were also conducted in a virtual station in which all the environmental conditions were identical. Besides the advantage of conditioned surroundings, a virtual station also has the benefit that various environmental elements can be manipulated quickly and relatively cheaply. With its visual images, ambient sounds and freedom of movement, the virtual environment offers a true to life representation of reality (Blascovich, Loomis, Beall, Swinth, Hoyt & Bailenson, 2002; Kardes, 1996; Massara, Liu & Melara, 2010; Riva, Mantovani, Capideville, Preziosa, Morganti, Villani, 2006). The respondents were unaware of any change in the degree of stimulation, such as the addition of certain music, colour, light intensity, advertising and infotainment. Also relevant, considering the subject of this dissertation (waiting experience), is that in the virtual world the objective duration of stay at the station/on the platform can be recorded both easily and accurately. Another great advantage of an online enquiry is its extensive reach – a large and widespread group of experimental subjects in a short period of time (Gosling, Vazire, Srivastava & John, 2004; Kraut, Olson, Banaji, Bruckman, Cohen & Couper, 2003). Last but not least, many different simulations can be tested, such as when the experimental subjects were asked to take a certain train and using two scenarios: must (in a hurry) and lust (not in a hurry). Also the degree of density (busy/quiet) was varied in all studies.
However, a virtual environment also has its disadvantages. Respondents have to have certain skills to manoeuvre their way through the station with the aid of mouse or arrow keys (Huang & Claramunt, 2005; Loomis, Blascovich & Beall, 1999). Moreover, all experimental subjects perform the research from behind their own computer, which means the screen and volume settings cannot be influenced, nor other possibly distracting environmental variables. Nevertheless, despite these differences in methodology, both research methods deliver comparable results. Waiting time, for example, was overestimated in both the field study and the virtual studies and in all studies it appeared that the longer the objective waiting time, the longer and more boring the wait was perceived. Also apparent from both the field and the online colour and light studies was that a low light intensity resulted in the most positive station and wait evaluation. From the results of the music studies we can conclude that, both in the field studies and the online study, music is appreciated on a quiet platform but not on a busy one. Finally, the results of the field and virtual studies on infotainment reveal that a platform with infotainment was appreciated more than one without and both methods demonstrate that infotainment on a busy platform generated the most positive effects. The conclusion may be drawn that a virtual world serves the purpose of measuring dissimilarities between different environmental manipulations and that its ecological validity is high.

9.15 RECOMMENDATIONS FOR FUTURE RESEARCH

The results of the studies in this thesis have shed new light on the relationship between the environment and the station and waiting experience, including the differentiation between busy and quiet surroundings and between goal- and less goal-directed passengers. With these insights, measures can be taken to ameliorate the station and waiting experience (Chapter 10) as well as being applicable for enhancing the (busy) areas of other functional and hedonic service providers, such as airports, hospitals, shopping malls and amusement parks.

However, the results also raise new questions that future research can answer. For example, it has become clear that arousal plays a central role in the processing of environmental stimuli but that these stimuli are sooner processed mentally than physically. Further investigation into the role of arousal in relation to information processing can offer more insight into the discrepancy between physical and mental stimulation. In our studies it was the experimental subjects themselves who indicated how aroused they felt. Arousal can, however, also be measured physically by ECG, blood pressure, heart rate and skin conduction (Bolls, Darrel & Muehling, 2003; Droit-Volet & Meck, 2007). Moreover, these studies did not enquire after how complex the environment and the information density was experienced. Including the measurement of physical arousal in future research and combining this with questions on the complexity of the environment will enable a keener analysis of how arousal actually works in the organism.

With regard to the station and waiting experience, the combination of (un)conscious attention and the perceived hedonic tone seem to determine whether the environment is more/less positively experienced and the wait as longer or shorter. With regard to the manipulations, future research could systematically study the level of the degree of stimulation, from barely to intensely noticeable. The manipulations in our studies, for example, used a limited number, namely a few colours, types of music, light intensities and forms of infotainment. Future research could study the effects of a larger range of intensities per environmental manipulation, such as a gradation in music volume from barely to extremely audible. The same applies to the visibility of the light intensity and infotainment, from barely to extremely visible. This will enable the ascertainment of how station and waiting experience is influenced by the intensity of stimuli, of where the line is between conscious and unconscious perception and of where the comfort zone begins and ends. Other research might incorporate more colours, types of music or forms of infotainment to determine more accurately which content of the stimuli leads to certain reactions. Also the effects of environmental manipulations that influence the perception of other senses, such as smell, touch and maybe even taste could be studied.

Whereas our studies always focused on manipulating just one of the senses, interactions between diverse environmental stimuli might produce different results. Our findings reveal that identical stimuli are processed differently by various senses.

Incongruent auditive stimuli in a quiet environment, for example, influence the waiting experience positively, as congruent visual stimuli do in the same context. Our results suggest that the combination of auditive and many visual stimuli lead to a *mental overload* (Bruins & Barber, 2008, Lang, 2000). A further investigation into the (in)congruent processing of combined stimuli perceived by various senses can offer an even more detailed insight into the processing of environmental stimuli, the evaluation of the service, the waiting experience and people's behaviour. Finally, our studies considered two moderators: motivational orientation and the degree of density. As with the environmental stimuli, a further refinement of the moderators could encompass other motivations or a gradation in density. Also other moderators could be investigated, such as the time of day or the influence of the weather. Identical environmental manipulations might well show other effects early in the morning than late at night, just as fine or bad weather might influence the evaluation of the service or the waiting experience differently (Eroglu, Machleit & Chebat, 2005; Kaltcheva & Weitz, 2006; Massara, Liu & Melara, 2010; Oakes & North, 2008; Van Bommel & Van den Beld, 2004).

CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS FOR NETHERLANDS RAILWAYS (NS)

‘AS SOON AS WE MAKE FULL USE OF OUR FACULTIES, COMMIT OURSELVES HEART AND SOUL TO ANYTHING, LIVE LIFE RICHLY INSTEAD OF MERELY EXISTING, OUR INNER TIME SPENDS OUR RATION OF CLOCK TIME AS A DRUNKEN SAILOR HIS PAY. WHAT ARE HOURS OUTSIDE SEEM MINUTES INSIDE.’

JOHN BOYNTON PRIESTLEY, 1894-1984


@ HuaHin

10.1 INTRODUCTION

In this dissertation we have investigated the degree to which the environment influences the station and waiting experience of passengers. Whereas the previous chapters studied the relevance of waiting time (Chapters 1 and 2), discussed various theories on waiting time and environment (Chapters 3 and 4), presented the results of empirical studies (Chapters 5–8), and linked the findings to the theories previously examined (Chapter 9), this current chapter will first address the general role of waiting time for Dutch service providers before scrutinizing a number of relevant theoretical concepts and translating insights gained from this dissertation into recommendations for NS.

10.2 SERVICES AND WAITING

From our exploration of the waiting time problem for service providers (Chapter 2) it appeared that waiting is usually experienced as tedious unless the service is considered extremely useful. In such a case, waiting can even contribute to experiencing the service more intensely, such as waiting for a thrilling attraction at an amusement park. Particularly with functional services, such as an airport, post office or train station, clients are goal-directed and conscious of the time and they find waiting tedious. With more hedonic services, such as a museum or amusement park, visitors are less goal-directed and aware of the time and they experience waiting as less bothersome. Furthermore, with both functional and hedonic services, customers can find themselves in the *telic* or *paratelic* state (Paragraph 4.11), i.e. certain people can enjoy a train journey, a flight or a visit to the shops or a hospital, while others regard this as a functional activity. In this way, occasional visitors take their time more and are more open to new experiences than those who use the same service on a regular basis; the latter are already acquainted with the service and set greater store by an efficient service process. In Figure 10.1 various services have been arranged in a matrix that shows the degree of functionality on the Y axis and the importance of service-related time on the X axis. The same figure also shows the motivational orientation of customers according to the telic and paratelic state and we can see that the time awareness is greater with functional than with hedonic services. As the focus of the majority of customers of functional services is efficiency-oriented, it is important that they experience a sense of control on the time (clocks, real-time information) and space (overview), and a positive environment and waiting experience is created when the surroundings are calming and not overly stimulating. With a hedonic service on the other hand, efficiency is of less importance to the majority of the customers; as enjoyment is paramount, a sense of control on time and space is secondary. In this case, a positive environmental and waiting experience is created when the surroundings are stimulating and offer distraction. With regard to waiting experience it seems plausible that the *attentional* model (Paragraph 3.9.3) is applicable to functional services, and the *storage size/ segmentation* model (Paragraph 3.9.1 and 3.9.2) to hedonic services. After all, with functional services more attention is paid to the time, whereas with hedonic services everything revolves around the activity and the creation of a memorable event (Pine & Gilmore, 1999; Gilmore & Pine 2008).

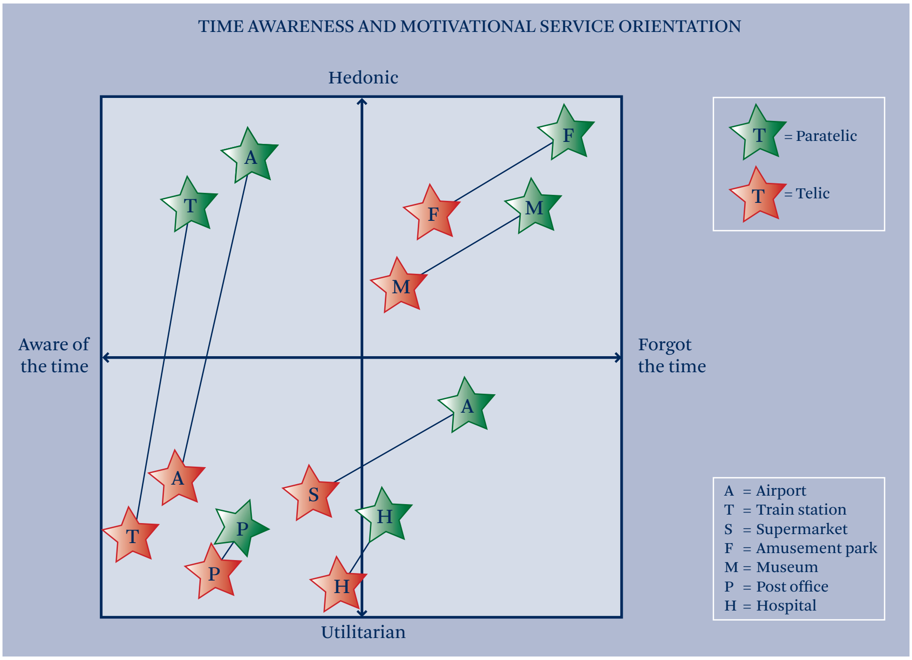


Figure 10.1 Time awareness and motivational orientation of various services (Chapter 2)

The differences between customers in the telic or paratelic state are not as great with purely functional or purely hedonic services as they are with travel. Travelling by plane or train might be functional but it can also be a pleasant experience. However, owing to the prescheduled departure, time itself can never be fully abandoned and thus remains a focus of the passengers' attention. With must and lust passengers being found at either an airport or a train station, we will now discuss their waiting experience at a station in greater detail.

10.3 STATION ENVIRONMENT AND WAITING EXPERIENCE

Various studies in this dissertation have shown how one's experience of time is qualified by the attention paid to it. Passengers who heed the time find the wait more tedious and long (Table 9.2). On average, train passengers spend just over seven minutes at a station, five of which are spent waiting on the platform (Table 9.1). In accordance with the conclusion of Pruyn and Smidts (1998), the evaluation of the wait (short/long, pleasant/tedious) seems to determine the satisfaction with the wait more than the estimation of the time does. The studies also elucidate the influence of the environment on the waiting experience. As with time also the attention to the environment plays a role, whereby passengers indeed perceive the environment, albeit in part unconsciously. For example, passengers experience that time passes more quickly on a platform with stimulating music, dimmed lighting and cool colours than on a platform with calming music, much lighting and warm colours. However, on interrogation, their opinions diverge. Apparently, passengers have a conscious, primarily cognitively inspired image of a station that is at odds with the unconscious, affective experience. They say they do not need advertising or music at the station whereas the findings of the experimental studies show that they do appreciate them. Passengers also feel that the station should be brightly lit, yet here, too, the results show that dimmed lighting affords the most positive station and waiting experience. In order to interpret the environmental influence better, several theoretical concepts will now be briefly discussed.

10.4 OPTIMAL AROUSAL THEORY

When passengers wait on a platform for their train, they have sufficient time to take in their surroundings (Derval, 2007; 2009). Together with the quality of the staff and the service, the quality of the environment determines how the service is experienced (Baker 1986; Bitner, 1992). Environmental stimuli are cognitively and affectively processed via the senses and initiates approach or avoidance behaviour. With avoidance behaviour people want to leave the area as soon as possible, whereas with approach behaviour they want to stay longer, to explore and to purchase (more) (Mehrabian & Russell, 1974).

Passengers feel pleasant when they perceive sufficient environmental stimuli; they then find themselves in the comfort zone. The opposite is the case when they perceive too few or too many stimuli. This is demonstrated in Figure 10.2 by the inverted U-curve (Hebb, 1955; Berlyne, 1971; Wundt, 1910). With an optimal number of environmental stimuli the stimuli are experienced as congruent, i.e. logical and in keeping with the expectation and the goal of the consumer or the degree of density at that moment (Eroglu, Machleit & Chebat, 2005; Kaltcheva & Weitz, 2006; Massara, Liu & Melara, 2010; Oakes & North, 2008). Congruent visual stimuli afford the attainment of an optimal *processing fluency*, one that demands the least mental energy (Houston, Bettencourt & Wegner, 1998; Hui, Dube & Chebat, 1997; Osuna, 1985). With the aim of making the waiting environment and waiting experience more pleasant, the studies in this dissertation added either more or fewer stimuli to the environment in the shape of music, infotainment, colour and light (Chapters 6, 7 and 8 and Figure 10.2).

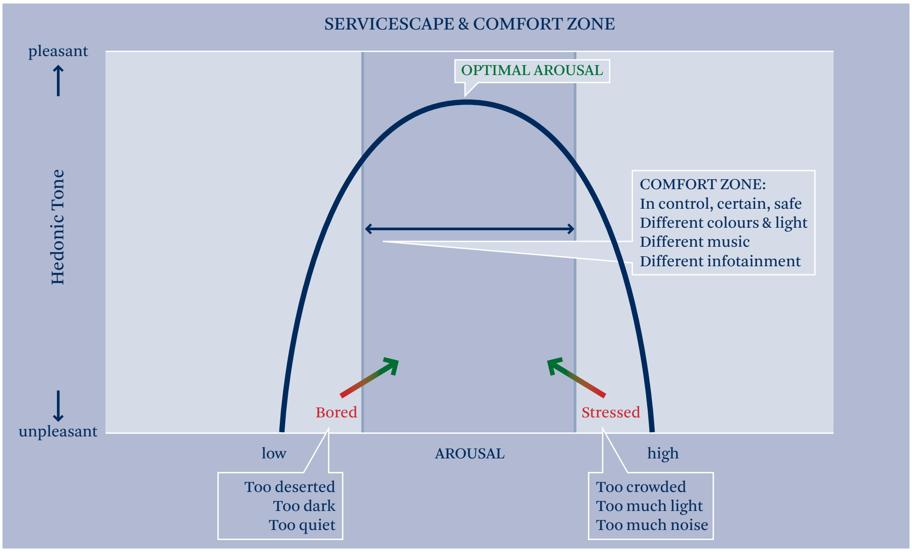


Figure 10.2 Comfort zone regulation with environmental stimuli

10.5 REVERSAL THEORY

Michel Apter (2007) goes one step further and posits that it is the context that determines how many stimuli result in pleasure at any given time. He differentiates between two levels (low and high) of optimal arousal, whereby people who are stressed require few environmental stimuli and people who are bored require many (Figure 10.3). This is why our studies have distinguished between the passengers' motivational orientation. Must passengers are utilitarian, are more in a hurry, focused on the journey and heed environmental distraction less. They prefer orderly surroundings that are not too stimulating. Lust passengers, on the other hand, are more hedonistically oriented; they are less in a hurry, less focused on the journey and their attention is more on their surroundings. They are more receptive to distraction and environmental stimuli. Figure 10.3 shows the two *optimal arousal curves*, one for must and one for lust passengers. It is clear that must passengers are less tolerant of environmental stimuli than lust passengers.

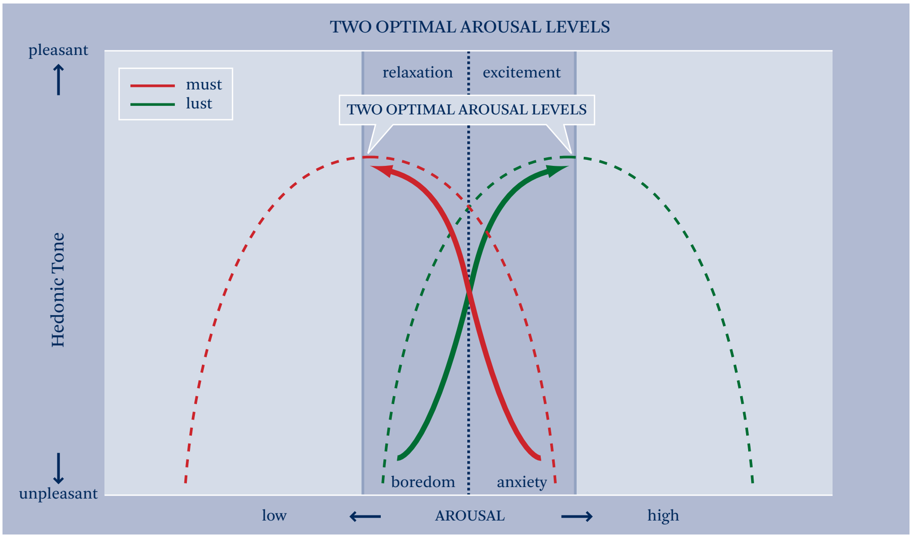


Figure 10.3 Optimal arousal curves for must and lust passengers

Also the presence of many other passengers evokes extra environmental stimuli, whereas a sparsely populated platform hardly stimulates at all. Hence the reason why our studies also allowed for the degree of platform density, besides motivational orientation. The findings will be discussed from different perspectives, following which recommendations for NS will be made. We will start by addressing the results of environmental stimuli and density and subsequently environmental stimuli and passenger type.

10.6 CONCLUSION ENVIRONMENTAL STIMULI AND DENSITY

It has become clear from these studies that the presence of other people affords more stimuli. When the platforms are busy, the number of stimuli in the environment should therefore be minimized, but when it is quiet, stimuli could be added. In busy and quiet periods, the right balance of stimuli in the shape of coloured light, music and infotainment can induce positive, affective reactions. As passengers do not appear to be receptive to extra stimuli on a busy platform, soft music, cool colours and a low level of lighting afford greater pleasure, a better evaluation of the platform and more approach behaviour. In contrast, passengers in more quiet surroundings are receptive to stimuli and they appreciate stimulating music, warm colours and (also!) a low level of lighting. Congruent visual stimuli provide an optimal *processing fluency*, which is to say that passengers on a busy platform require congruent visual input. With infotainment this means a fast screen change on a busy platform and a slower one on a quiet platform.

10.7 CONCLUSIONS ENVIRONMENTAL STIMULI AND PASSENGER TYPE

What also appeared from the studies in this dissertation was that must and lust passengers react differently to environmental stimuli, often in combination with the degree of density. Lust passengers, for example, feel better on a quiet platform with stimulating or fast music, dimmed lighting and warm colours and they prefer the screens to offer distraction, such as (rail-related) informative programmes. Must passengers, on the other hand, find greater pleasure when they feel they are in control of their stay, i.e. not only that they can orient themselves, feel assured and have a grip on the time but also be distracted as little as possible by environmental stimuli. Must passengers thus lean strongly towards cool colours, a low level of lighting, no or only relaxed/slow music and wish to see serious content on the screens, such as news and topical affairs. By adding the correct environmental stimuli at the right time, the score for the general evaluation of the platform can increase the score by a half to a full point. It goes without saying that negative stimuli should first be eliminated or neutralized before adding positive ones. With regard to visual impressions, negative visual stimuli, such as graffiti, dirt and an unappealing view, should be prevented as much as possible. With regard to colour, the negatively experienced colour grey of the platform could be broken up here and there by adding colour or coloured light. With regard to sound this means that unwelcome ambient sounds, such as from noisy machines, traffic or other sources, should be avoided and replaced by music to soften the wait.

10.8 MOVING VERSUS STAYING

With the gained insights it is possible to relate environmental stimuli, density and motivational orientation to the prime functions of a station: moving and staying. Whilst moving, passengers are goal-directed and, like must passengers, are utilitarian in orientation, whereas those who are static (i.e. in the stay mode) are not and, like lust passengers, are hedonistically oriented. The transfer areas (pedestrian routes) allow passengers to change quickly and easily from one means of transport to another, with their focus being on catching the next connection. The stay areas at the station (waiting rooms, commercial facilities) enable passengers who are in good time to spend it pleasantly. The moment passengers switch from moving to staying, their focus shifts from speed and ease to comfort and experience. Having arrived at the platform, the travel orientation changes from utilitarian to hedonic, which is why passengers on the platform are then more receptive to environmental stimuli. Distraction and a stimulating environment are now welcome (Apter, 2007). The difference between moving and staying is visualized in the pyramid of customer needs (Figure 10.4, Paragraph 1.8).

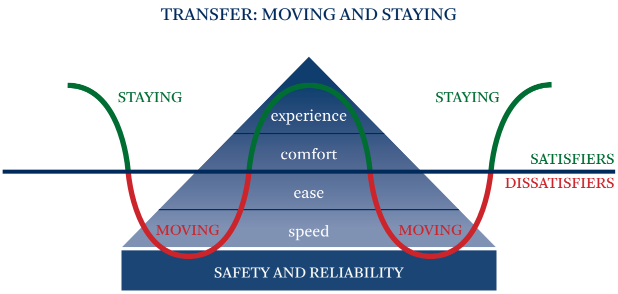
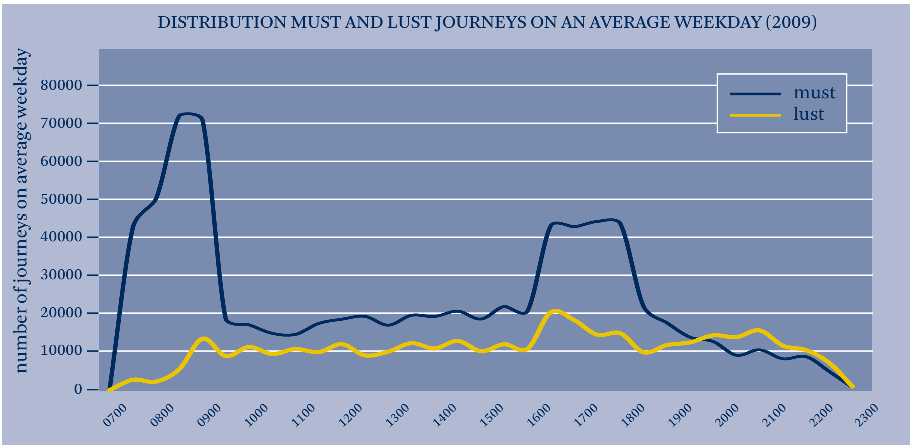


Figure 10.4 Different qualities for moving and staying

Our studies reveal that must and lust passengers react differently to stimuli in a busy or quiet environment. From internal NS research (KTO, 2009) we know that during peak hours substantially more must passengers travel and that the platform is more crowded at those moments (Figure 10.5). During off-peak hours the platform is less crowded and we find a more balanced mix of must and lust passengers. Measures to improve the waiting experience on the platform can thus be logically tailored to two periods: the peak hours and the off-peak hours.



Must = work-school-business journeys
Lust motive = leisure and other journeys.
Sources: Relatiematrix 2009 (= file with all journeys between all stations);
KTO 2009 (= Customer Satisfaction Survey, 2009),
N KTO = 60.000 observations;
cross table: planned departure time from departure station * travel motive.

Figure 10.5 Distribution must and lust journeys on an average weekday (2009)

10.9 CREATING A STEERING MATRIX

When combining moving and staying with the degree of density, we arrive at a matrix with four quadrants in which moving and staying are set alongside peak and off-peak hours (Figure 10.6). As with a kaleidoscope, the different quadrants can be turned in such a way that each perspective requires its own interpretation with regard to environmental stimuli. The extreme quadrants are formed by the combination moving/peak and staying/off-peak. During peak hours, moving passengers desire control and overview and an environment with few stimuli. During off-peak hours, staying passengers desire distraction and a stimulating environment. With regard to environmental stimuli, the combinations of moving/off-peak and staying/peak can be found somewhere in between, whereby the accent with moving is more on the utilitarian support of the travel process and the accent with staying is more on the hedonic support of the stay. We will now address the different quadrants one by one.

Quadrant 1 is the one in which passengers are the least receptive to environmental stimuli. When it is busy, goal-directed passengers are already quite stimulated and too many environmental stimuli could cause them to become overstimulated and (even more) stressed. By creating a sense of calm with soothing colours and (possibly) music, the number of stimuli can be instinctively decreased, causing stressed passengers to wind down. When moving, the sense of control (*sense of place and time*) is important and this should follow through to the transfer areas, which should be orderly, well-signposted and offer travel information whilst keeping the degree of distraction to a minimum. During peak hours we recommend that the platforms be brightly lit, with no or only soft background music, not to use too stimulating colours and to show predominantly serious content on the screens, such as (travel-related) news and topical affairs. As stated earlier in Paragraph 10.6, fast screen changes are congruent with density and are positively assessed.

Quadrants 2 and *4* are those in which passengers are receptive to stimuli albeit that over- and understimulation should be avoided. In *quadrant 2* passengers are goal-directed and, as in quadrant 1, require control but because it is quiet they have a better overview. Calming music stimulates them enough to feel pleasant but not enough for them to lose their sense of control. Sufficient lighting and cool colours allow passengers to move quickly and remain in control. Infotainment with real-time travel information combined with travel-related content can offer certainty and results in greater satisfaction.
In *quadrant 4* passengers are in the stay mode, which means they are receptive to environmental stimuli, but as it is also busy, they already have sufficient stimuli to process. Here, too, the stimuli will have to be chosen carefully so as not to overstimulate and they must be as congruent as possible with the passengers' goals.

With passengers now less goal-directed and the human density affording sufficient visual input, music would cause too much arousal. Warm colours are found to be pleasant and infotainment distracts them from the wait. Preferably, the content of the infotainment should be related to the destination, i.e. information on (activities in) the towns serviced by the train.

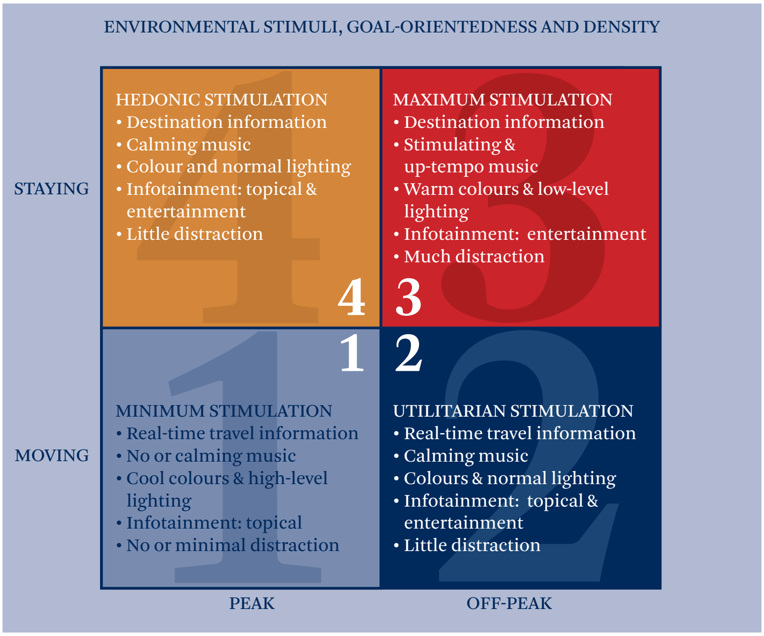


Figure 10.6 Environmental stimuli, goal-orientedness and density

Quadrant 3 is the one in which passengers are the most receptive to environmental stimuli. Here, passengers are in the stay mode and it is quiet, which means they are most in need of environmental stimuli. Currently, the platforms at most of the stations have the neutral colour grey and passengers are barely offered any distraction, particularly when it is very quiet. It is at such quiet moments, that passengers waiting on the platform are thus impoverished when it comes to stimulation and they become bored. Adding an optimal number of stimuli by way of (dimmed) ambient lighting, stimulating colours and music draws passengers from their boredom and into the comfort zone. Distraction during off-peak hours can be offered with infotainment by alternating news and topical affairs with more relaxed content, such as travel-related information and entertainment (albeit that the screen changes should not be too fast). Finally, during off-peak hours passengers feel the most comfortable with dimmed lighting.

10.10 RECOMMENDATION ENVIRONMENTAL PROGRAMME

This PhD thesis has demonstrated how considerable the influence is of station and platform design on the cognitive and affective experience of passengers. Specifically, a dynamic programme could be developed for each environmental stimulus, thereby taking density (e.g. peak/off-peak) and the function of the station area (e.g. moving and staying) into account.

Colour and light programme: for colour and light a station plan can be drawn up that appoints where and at what time different colour and light stimuli are added to the environment in order to create a positive station and waiting experience. Both during peak and off-peak hours, coloured lighting can accent the platform to break up the dominant colour grey and make passengers feel more comfortable. We recommend using cool colours in the transfer areas, because these calm people down and shorten the perceived time. Passengers are then less stressed whilst moving and think that they reach their train sooner. We also recommend using warm colours in stay/waiting areas as they are more stimulating, have greater appeal and afford greater pleasure. Passengers feel more comfortable in dimmed lighting and during off-peak hours the wait seems to be less long. We thus recommend using low-level lighting on the platform and turning this up automatically when the train enters the station. Passengers feel more comfortable with dimmed lighting whilst they are waiting but will be alerted by the increased brightness when their train arrives; moreover, they will have better vision when boarding.

Music programme: for music, too, a station plan can be drawn up that specifies where and at what time different musical genres will be played to create a positive station and waiting experience. When programming music it is important to avoid overstimulation. That is why we recommend not playing any music in the transfer areas so as not to overstimulate the goal-directed passenger. Whilst minimizing noise pollution there, one could opt for soundscapes (nature sounds) to calm moving passengers. Also when crowding is dense, such as on a busy platform, music can over-excite, hence our recommendation to play no music at large stations during the busy morning peak hours. In the morning people still have to 'get going' and are already confronted with enough stimuli. Music would then result in a *mental overload* and a lower hedonic tone. However, when it is quiet, passengers are understimulated and with their hedonic tone being too low, the addition of stimulating music can fill the so-called empty space with pleasant stimuli, hence making the passengers feel better. We recommend playing stimulating music in waiting areas in quiet periods (off-peak or small stations) to make the wait more pleasant and seem to take less long. During the afternoon rush hour passengers have already got going and are more receptive to stimuli than in the morning peak. We now recommend playing calming music in waiting areas and harmonious music on the platform. In the evening it is quiet at the station and music can fill the emptiness but at the end of the day people are less energetic and are less tolerant when it comes to stimuli. Hence our recommendation to play calming music in the evening, such as instrumental, classical music. The extra calming stimuli afford a more pleasant wait and a sense of security.

Infotainment programme: finally, a station plan can also be drawn up for infotainment that stipulates where and at what time certain content is shown with the aim of creating a positive station and waiting experience. We recommend only showing infotainment in waiting areas (platform, catering establishments, shops); in transfer areas passengers are moving and have neither the time to look at the screens nor notice them. We also recommend that the programme be mute so as not to overstimulate either must passengers or when it is busy (see music programme). When programming infotainment it is imperative that the content is congruent with other visual stimuli and that it concurs with the passengers' objectives. During peak hours we suggest showing short and quickly alternating topical news items. For goal-directed passengers the content should be serious, informative and topical; they will then experience a congruent *processing fluency* and find the wait pleasant. Longer items can be shown during off-peak hours, with commercial breaks alternating with topical affairs and entertainment. The tempo of items and screen changes can be slower than during peak hours as this concurs better with the visual impressions of the passengers. With screens being suitable for showing both utilitarian and hedonic images, as well as topical and specific information, the passengers' pleasure and sense of control is increased. Their sense of control is augmented further by incorporating real-time travel information of the platform concerned in the standard programming (e.g. with a ticker tape stating departure time of the next train and the current time). The programming will have to be renewed at least twice daily (morning and evening programme), so that passengers are not confronted with the same content on their return journey. Infotainment can also be shown in shops and catering establishments, likewise with a ticker tape stating upcoming train departures, the current time and possible anomalies. This way passengers will also remain in control of their travel process in other parts of the station.

10.11 ENVIRONMENTAL STIMULI AND STATION DOMAINS

It has become clear in this thesis which environmental stimuli can be influenced the best to steer the waiting experience in a positive direction. The insights from our studies not only concur with but also give additional underpinning to the four station domains used in the Dutch rail sector: arrival domain, welcome domain, travel domain and leisure domain (Bureau Spoorbouwmeester (*Bureau Dutch Rail Architecture*), 2006; 2010).

We have also demonstrated that the situation (busy or quiet, must or lust) has an effect on the waiting experience. This means that for an optimal travel experience the design of the station environment must not be static but dynamic. On discussing the four quadrants (Paragraph 10.9) and the environmental programme, it became evident that people's requirements change during the day: (must) passengers have little need of extra stimuli during peak hours, whereas (lust) passengers certainly appreciate them during off-peak hours. In dual station areas, where passengers stay *and* move, such as on a platform, careful thought is warranted on the programming of environmental stimuli. We recommend developing a dynamic programme of stimuli that is specially tailored to the density and function of the areas in which the passengers find themselves. It goes without saying that few stimuli should be added to the platform during peak hours and extra during off-peak hours. Also the passenger's mood should be taken into consideration; not every passenger wants extra stimuli and he/she should be able to withdraw from them. The environmental stimuli could be adapted to the situation, e.g. by *not* adding extra stimuli in the vicinity of stairs or escalators where it is usually busier. In contrast, extra stimuli could be added to the central section of the platform to attract and encourage those who are receptive to them to walk further down, thus stimulating a more even distribution of passengers over the platform. The end of the platform can be kept stimulus-free for those passengers who are in search of peace and quiet and wish to distance themselves from the crowd.
A stimulus dynamic is less relevant in purely stay and transfer areas. Shops and waiting areas can always be stimulating, e.g. with warm colours and stimulating music. In the transfer areas, such as the pedestrian routes, the number of stimuli must always be low, e.g. with cool colours and little distraction. We recommend NS to have formal discussions with Bureau Spoorbouwmeester and ProRail on the function of the platform from the perspective of passengers' needs and the time they spend there with the aim of alternating the stimuli they experience during the day and thus meeting their varying needs as optimally as possible.

10.12 SUGGESTIONS FOR FURTHER RESEARCH FOR NS

This dissertation has offered insights into passengers' behaviour and their processing of environmental stimuli. Further research can embroider on these insights and enable NS to hone customer satisfaction.

– Although our studies were conducted at a large station (Leiden Central), it is fair to assume that the insights can also be employed at smaller or even foreign stations. In order to ascertain whether our findings are indeed applicable to *all* stations (Van Hagen & De Bruyn, 2002), one could consider conducting the same research there.

- In the virtual studies a train departed every ten minutes, which meant that the majority of the passengers never had to wait long. With longer waiting times possibly leading to other findings, further research into this with regard to station and waiting experience might yield new insights.
- The studies discussed here focused on the influence of auditive and visual stimuli on the waiting experience on the platform. This focus could be widened to other senses such as smell and touch (e.g. tactile value) or sensation/feeling (e.g. temperature/climate) and the interactions between them (Derval, 2010; Morrison, Gan, Dubelaar & Oppewal, 2010). It is known that smell can influence a person's behaviour, not only with regard to making a wait more pleasant (Chebat & Michon, 2003; Mitchell, Kahn & Knasko, 1995; Spangenberg, 1990; Spangenberg, Crowley & Henderson, 1996), but also for example to initiating behaviour that is conducive to a cleaner or safer environment (Holland, Hendriks & Aarts, 2005; Van Bommel, 2001; Keizer, Lindenberg & Steg, 2008; Wilson & Kelling, 1982).
- By choosing a unique content (of music, infotainment and smell), the environment can take on a character of its own which might well boost the brand perception of NS (Lindstrom, 2005; 2008). With the focus on branding currently being quite visual and static, NS might consider showing content that fits the company's mission and objectives as well as varying the light intensity and colours in the course of the day. With regard to the other senses, a subtle corporate fragrance could be diffused in station areas and on the train, thereby awarding them extra cachet (Derval, 2010, Lindstrom, 2005; 2008), and as for auditory stimuli, NS might consider developing its own unique sound logo (jingle) and playing a personal repertoire[16] to match the mood of the passengers. Further research can disclose the influence of the environment on brand perception.
- The insights gained from this thesis can also be applied to other environments than just the platform, such as station shops or the train.
  - In station shops passengers who are in a hurry have limited time and they will thus want to orient themselves quickly, make a hasty purchase *and* remain in control of the travel process. Those who have more time on their hands wish to spend it leisurely and are thus more receptive to surprises and distraction. One could consider investigating the degree to which a shop could be divided into a *fast* and *slow area*. This would enable the must passenger to do his/her daily shopping quickly (overview, few stimuli) and the lust passenger to take his/her time in a more relaxed fashion (stimuli and distraction).
  - On the train passengers are not so occupied (anymore) with the travel process but sooner with staying (waiting) on the train until it reaches their

16 Source: Several interviews with Maarten Hartveldt, a renowned composer of film scores.

destination. This means that they can undertake other activities during the journey. Some of the passengers will be utilitarian in their orientation and will want to undertake serious and goal-directed activities, such as working or preparing for a meeting. They want a quiet environment with sufficient lighting so that they can concentrate better on their task. Other passengers are hedonistically oriented; they are more receptive to distraction and environmental stimuli and will wish to undertake activities of a more hedonic nature, such as looking out the window, talking to others or listening to music. It goes without saying that even on the train the hedonic tone, the sense of control and passengers' behaviour can be influenced by environmental stimuli. In this case one can distinguish between a quiet and a lively area. The first findings concerning influencing behaviour with environmental stimuli on the train reveal encouraging results (Debets & Ruitenburg, 2010).

- This PhD thesis has drawn on environmental psychology with the aim of ameliorating the waiting environment. The methods used here can also be employed in studies that have other objectives, such as:
  - increasing the sense of security, reliability or cleanliness.
  - decreasing undesirable or rough behaviour (vandalism, loutishness, talking loudly in a quiet compartment) or the sense of density.
  - stimulating desired behaviour, such as improving the flow of the station (pedestrian route and walking speed) or accelerating the process of getting on and off the train.
- The experimental subjects in this thesis were unaware of the environmental manipulations. Our studies have shown that their cognitive reactions were usually the antithesis of their affective reactions. Further research could be conducted in two ways:
  - First, with measures aimed at positively influencing the station experience, meticulous research methods should be chosen that distinguish between instrumental and experiential aspects. The first studies of experiential measures at stations reveal that by taking combined measures the score can be raised by (up to) one full point and that ambience contributes more to the general evaluation than instrumental aspects (NS Poort, 2010; NS Visie op stations, 2006; Van Hagen, Boes & Van den Heuvel, 2009; Van Hagen & Heiligers, 2010).
  - Second, research could be conducted on environmental changes with the experimental subjects previously being informed thereof. The chances are that they will experience the environment differently and that this can lead to other cognitive and affective reactions.
- Although this dissertation distinguished between two types of passenger (must and lust), one could broaden this to include more types, as formulated with, for example, the *needscope types* (Van Hagen, 2009). Based on Jung's archetypes

(1959), NS differentiates six passenger types: explorer, individualist, functional planner, certainty seeker, socializer and convenience seeker (Van Hagen, 2009; Van Hagen, De Gier & Visser, 2005; Van Hagen & Hulster, 2009; Van Hagen & De Gier, 2010). Combining the insights of this PhD thesis with the needscope types can afford a more precise differentiation between directive solutions for specific customer groups or in the development of future services and the design of the environment. Further research should offer a more accurate insight into how each passenger type experiences the environment, which in turn will enable NS to address their various needs even more explicitly.

- We have demonstrated that the needs of passengers at a station differ. In order to allow different passengers to experience a pleasant stay at the station, the lay-out thereof should thus not be static. The passengers' emotions are not static either; they change on an individual level according to the place and activity in the station. The design of the station can be tailored to the *different phases of emotions* that a customer undergoes during a visit. Figure 10.7 visualizes how different emotional phases succeed one another at the station. When passengers arrive at the station, they check whether they are on time for their train and from which platform it will depart (*stress*). They feel euphoric if they catch it just in time, but irritated if they have just missed it. If they arrive in good time, they can wait in leisure, but if it takes too long, they will become bored. Further research can hone the various phases that passengers undergo and provide insight into the emotions and needs in each phase. This insight will moreover enable NS to design a station that is even more specifically tailored to passenger requirements.

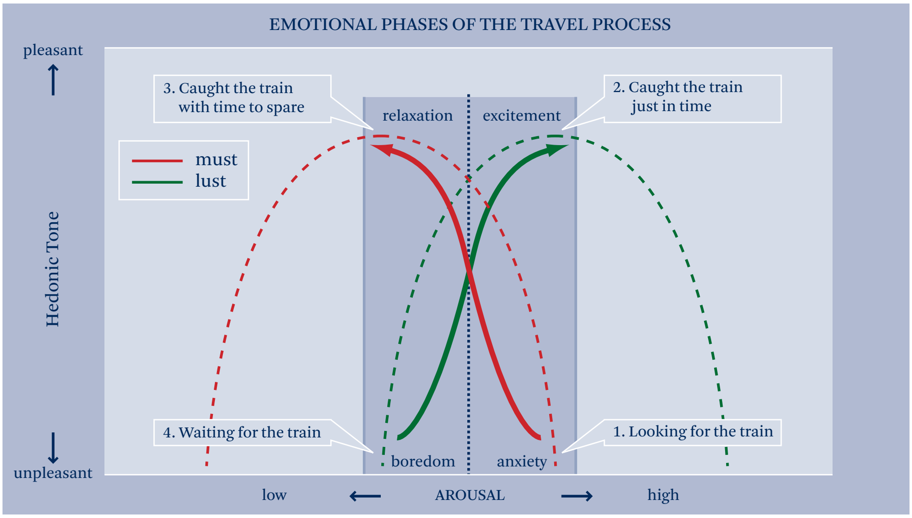


Figure 10.7 Travel process and corresponding emotions

10.13 OVERALL CONCLUSION

The results of the studies in this thesis have shed new light on the relationship between the environment and the station and waiting experience, including the differentiation between busy and quiet surroundings and between goal- and less goal-directed passengers. With these insights, measures can be taken to ameliorate the station and waiting experience as well as being applicable for enhancing the (busy) areas of other functional and hedonic service providers, such as airports, hospitals, shopping malls and amusement parks.
It can be generally concluded that waiting passengers are receptive to environmental stimuli so as to be distracted from the unpleasant wait. We have demonstrated that adding the correct environmental stimuli to the platform at the correct moment can afford a score increase of more than half a point and that passengers experience greater control and satisfaction, show more approach behaviour and evaluate the wait as more useful and pleasant. The key to the correct influencing lies in the intensity and complexity of the environmental stimuli to be processed. In the stay areas, such as platforms but also waiting areas and commercial facilities, passengers can be distracted by a large number of stimuli *on condition* they can remain in control of the travel process – hence the presence of clocks and real-time travel information (ticker tape on screens). In the transfer and congested areas the number of environmental stimuli should be minimized because passengers already have to contend with enough stimuli. The findings of our studies also demonstrate that opting for an 'easy' solution, such as a grey platform without music or any other distraction, is not conducive to a more pleasant wait. Nevertheless, with technical means it is relatively easy to alter the environment re time and space in such a way that it optimally matches passenger requirements. During the too quiet off-peak hours it is quite simple to add extra stimuli such as warm accents with coloured lighting or stimulating music and ditto infotainment. Music, coloured light and infotainment can be programmed to within a second to create different atmospheres at the station. This can be programmed ahead but also dynamically by using, for example, *visual pattern recognition* (Blunsden, 2005) whereby sensors and software determine how busy it is and then automatically start up the correct programme of music, infotainment, light intensity and colour. The advantage of automatic manipulation is that it can help assuage the stress passengers undergo when there is a disruption to the rail service, for example, and the platform is even busier owing to the train arriving late.

REFERENCES

Ackerman, D.S. & B.L. Gross. (2007). So many choices, so little time: measuring the effects of free choice and enjoyment on perception of free time, time pressure and deprivation. *Advances of Consumer Research*, Vol. 30, 290-294; eds. Punam Anand Keller and Dennis W. Rook, Valdsota, GA: Association for consumer Research.

Adams, F.M., & Osgood, C.E. (1973). A Cross-Cultural Study of the Affective Meanings of Color. *Journal of Cross-Cultural Psychology, 4*(2), 135.

Ang, S.H., S.M. Leong & J. Lim (1997). The mediating influence of pleasure and arousal on layout and signage effects. *Journal of Retailing and Consumer Services,* 4(1), 13-24.

Antonides, G., Verhoef, P.C. & Aalst, M. van (2002). Consumer Perception and Evaluation of Waiting Time: A field Experiment. *Journal of Consumer* Psychology 12(3), 193-202.

Apter, M.J. (1982). *The Experience of Motivation: The Theory of Psychological reversals.* New York: Academic Press.

Apter, M.J. (2007). *Reversal Theory. The Dynamics of Motivation, Emotion and Personality.* Oneworld Publications, Oxford, England.

Areni, C.S., & Kim, D. (1994). The influence of in-store lighting on consumers' examination of merchandise in a wine store. *International Journal of Research in Marketing, 11*(2), 117-125.

Areni, C.S. & Kim, D. (1993). The influence of Background Music on Shopping Behavior: Classical Versus Top-Forty Music in a Wine Store. *Advances in Consumer Research, 20,* 336-349.

Arneill, A.B. & A.S. Devlin (2002). Perceived quality of care: The influence of the waiting room environment. *Journal of Environmental Psychology.* 22, 345-360.

Aubert-Gamet, V. (1997). Twisting servicescapes: diversion of the physical environment in a reappropriation process, *International Journal in Service Industry Management*, *8*(1), 26-41.

Averill, J.R. (1973). Personal Control over Aversive Stimuli and its Relationship to Stress. *Psychological Bulletin, 80*(4), 286-303.

Babin, B.J., & Babin, L. (2001). Seeking something different? A model of schema typicality, consumer affect, purchase intentions and perceived shopping value. *Journal of Business Research, 54*(2), 89-96.

Babin, B.J., Hardesty, D.M., & Suter, T.A. (2003). Color and shopping intentions The intervening effect of price fairness and perceived affect. *Journal of Business Research, 56*(7), 541-551.

Babin, J.B., J.C. Chebat & R. Michon (2003). Perceived appropriateness and its effect on quality, affect and behavior. *Journal of retailing and Consumer Services,11*, 287-298.

Bailey, N. & Areni, C.S. (2006). Background music as a quasi clock in retrospective duration judgments. *Perceptual and Motor Skills*, *102*, 435-444.

Baily, N. & Areni, C.S. (2006). When a few minutes sound like a life time: Does atmospheric music expand or contract perceived time? *Journal of Retailing, 81*(3), 189-202.

Baker J., Grewal, D. & Parasuraman, A. (1994). The influence of store environment on quality inferences and store image. *Journal of the Academy of Marketing Science*, *22*(4), 328-329.

Baker, J. & Cameron, M. (1996). The effects of the Service Environment on Affect and Consumer Perception of Waiting Time: An Integrative Review and Research propositions. *Journal of the Academy of Marketing Science. 24*(4), 338-349.

Baker, J. (1986). The Role of the Environment in Marketing Services: the Customer Perspective. *The service Challenge: Integrating for Competitive Advantage*,. Eds. J.A. Czepeil, C. Congram & J. Shanahan, Chicago: American Marketing Association.

Baker, J., Grewal, D. & Levy, M. (1992). An experimental Approach to Making Retail Store Environmental Decisions. *Journal of Retailing, 68*(4), 445-460.

Bar-Haim, Y., Kerem, A., Lamy, D. & Zakay, D. (2010). When time slows down: The influence of threat on time perception in anxiety. *Cognition and Emotion, 24* (2), 255-263.

Baron, R.A., Rea, M.S., & Daniels, S.G. (1992). Effects of indoor lighting (illuminance and spectral distribution) on the performance of cognitive tasks and interpersonal behaviors: The potential mediating role of positive affect. *Motivation and Emotion, 16*(1), 1-33.

Batra, R. & Ahtola, O.T. (1990). Measuring the Hedonic and Utilitarian Sources of Consumer Attitudes. *Marketing Letters 2*(2), 159-170. Kluwer Academic Publishers, Manufactured in the Netherlands.

Beck, J.C. & Davenport T.H. (2001). *The Attention Economy. Understanding the new currency in business*. Harvard business school press, Boston.

Bell, J.S. (1998). Image and Consumer attraction to intraurban retail areas: An environmental psychology approach. *Journal of Retailing and Consumer Services*, *6,* 67-78.

Bell, P., Fischer, J.D. & Loomis, R.J. (1978). *Environmental psychology*. Philadelphia: W.B. Saunders Co.

Bellizzi, J.A., & Hite, R.E. (1992). Environmental color, consumer feelings, and purchase likelihood. *Psychology & Marketing, 9*(5), 347-363.

Bellizzi, J.A., Crowley, A.E., & Hasty, R.W. (1983). The effects of color in store design. *Journal of Retailing, 59*(1), 21-45.

Berlyne, D.E. (1971). *Aesthetics and Psychobiology*. New York: Appleton-Century-Crofts.

Berman, B. & Evens J. (1989). *Retail Management: A Strategic Approach*. Macmillan, New York.

Biner, P.M., Butler, D.L., Fischer, A.R., & Westergren, A.J. (1989). An Arousal Optimization Model of Lighting Level Preferences: An Interaction of Social Situation and Task Demands. *Environment and Behavior, 21*(1), 3-16.

Birren, F. (1969). *Principles of Color. A review of past traditions and modern theories of color harmony* (New York: Van Nostrand Reinhold). 2nd revised ed. (New Chester, Pennsylvania: Schiffer Publ., 1987).

Bitner, M.J. (1992). Servicescapes: The Impact of Physical Surroundings on Customers and Employees. *Journal of Marketing*, *56*(April), 57-71.

Bitner, M.J. (1990). Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. *Journal of Marketing*, *54* (April), 69-82.

Blascovich, J., Loomis, J., Beall, A.C., Swinth, K.R., Hoyt, C.L. & Bailenson, J.N. (2002). Immersive Virtual Environment Technology as Methodological Tool for Social Psychology. *PsychologicalInquiry, 13* (2), 103-124.

Block, R.A. (1981). Remembered duration: Effects of environmental- and process-context changes. *Paper presented at the meeting of the Rocky Mountain Psychological Association, Denver, CO.*

Block, R.A. (2006). Intending to remember information: The effectiveness and speed of attentional allocation. *Paper presented at the meeting of the Cognitive Science Association for Interdisciplinary Learning, Hood River, OR.*

Block, R.A. & Reed, M.A. (1978). Remembered duration: evidence for a contextual-change hypothesis. *Journal of Experimental Psychology: Human Learning and Memor, 4*, 656-665.

Block, R.A. (1990). Models of psychological time. In R.A. Block (Ed.), *Cognitive models of psychological time,* (1-35). Hillsdale, NJ: Erdbaum.

Block, R.A., Zakay, D. & Hancock, P.A. (1998). Human Aging and Duration Judgments: A Meta-Analytic Review. *Psychology and Aging, 13*(4), 584-596.

Block, R.A., & Zakay, D. (1997). Prospective and retrospective duration judgements: A meta-analytic review. *Psychonomic Bulletin & Review, 4*, 184-197.

Block, R.A., 1978. Remembered duration: effects of event and sequence complexity. *Memory and Cognition, 6*, 320-326.

Blunsden, S. (2005). Identification of Group Interaction. Literature Review. *Institute for Perception, Action and Behavior. School of Informatics. University of Edinburgh.*

Blöhbaum, A. & Hunecke, M. (2005). Perceived Danger in Urban Public Space: The Impacts of Physical Features and Personal Factors. *Environment and Behavior, 37*, 465487.

Bobko, D.J., Schiffman, H.R., Castino, R.J. & Chiappetta, W. (1977). Contextual effects in duration experience. *American Journal of Psychology, 90*, 577-586.

Boes, E. (2007a). Stations? Daar zit muziek in! Een onderzoek naar de effecten van muziektempo op stationsbeleving. *Master thesis Universiteit Twente, faculteit gedragspsychologie.*

Boes, E. (2007b). Stations? Daar zit muziek in! *"Colloquium Vervoersplanologisch Speurwerk". De X-pert factor*, 22 en 23 november, Antwerpen.

Bolls, P.D. & Muehling, D.D. (2003). The effects of television commercial pacing on viewers's attention and memory. *Journal of Marketing Communications, 9*, 17-28.

Boring, E.G. (1942). *Sensation and perception in the history of experimental psychology*. New York: Appleton-Centory-Crofts.

Boswijk, A., Thijssen, T. & Peelen, E. (2005). *Een nieuwe kijk op de Experience Economy. Betekenisvolle belevenissen*. Pearson Education, Benelux.

Botschen, G., & Crowther, D. (2001). The semiology of aesthetic atmospherics to study environmental design effects in retail outlets. *Studies in Social Marketing, Working Paper.*

Bovy, P.H.L. (1994). Welke rol speelt kwaliteit in het personenvervoersysteem? *Lezing op congres NHTV*, Utrecht, 10 maart.

Brady, M.K., & Cronin, J.J. (2001). Some new thoughts on conceptualizing perceived service quality: a hierarchical approach. *Journal of Marketing, 65*(3), 34-49.
Brengman, M. & Geuens, M. (2004). The four dimensional impact of color on shoppers' emotions. *Advances in Consumer Research, 31,* 122-128.
Brengman, M. (2002). The impact of Colour in the Store Environment. An Environmental Psychology Approach. *Dissertation*, RUG, Gent.
Brown, S.W. (1995). Time, change and motion: the effects of stimulus movement on temporal perception. *Perception & psychophysics, 57*, 105-116.
Bruins, J. & Barber, A. (2006). Crowding, Performance, and Affect: A Field Experiment Investigating Mediational Processes. *Journal of Applied Social Psychology*, *30(*6), 1268-1280.
Bruner, G.C. (1990). Music, Mood, and Marketing. *Journal of Marketing,* 94-104.
Buffa, E.S. & Sarin, R.K. (1987), *Modern Production/operation Management*. New York: Wiley.
Buffardi, L. (1971). Factors affecting the filled-duration illusion in the auditory, tactual and visual modalities. *Perception & Psychophysics*, *10*, 292-294.
Bureau Spoorbouwmeester (2006). *Spoorbeeldgids. Het spoorbeeld heeft een gezicht*. Utrecht. (Bureau Dutch Rail Architecture (2006).
Bureau Spoorbouwmeester (2010). *Het stationsconcept.* Utrecht, februari, definitieve versie. (Bureau Dutch Rail Architecture, (2010).
Burke, R.R., (2002). Technology and the consumer interface: what consumers want in the physical and virtual store. *Journal of the Academy of Marketing Science, 30* (4), 411-422.
Burnside, W. (1971). Judgment of short time intervals while performing mathematical tasks. *Perception and Psychophysics, 9*, 404-406.
Butler, D.L., & Biner, P.M. (1987). Preferred Lighting Levels: Variability among Settings, Behaviors, and Individuals. *Environment and Behavior, 19*(6), 695-721.
Baaijens, S., Bruinsma, F., Nijkamp, P., Peeters, P. Peters & Rietveld, P. (1997). *Slow Motion: een andere kijk op snelheid*. Infrastructuur en Logistiek nr. 25, Delftse Universitaire Pers.
Caldwell, C. & Hibbert, S.A. (1999). The influence of music tempo and musical preference on restaurant patrons' behavior. *Psychology & Marketing, 19*(11), 895-917.
Caldwell, C. & Hibbert, S.A. (2002). The Influence of Music Tempo and Musical Preference on Restaurant Patrons' Behavior. *Psychology & Marketing, 19*(11), 895-917.
Carmon, Z. (1991). Recent studies of Time in Consumer Behavior. *Advances in Consumer Research*, *18,* 703-705.
Casado Díaz, A.B. & Más Ruíz, F.J. (2002). The consumer's reaction to delays in service. *International Journal of Service Industry Management. 13*(2), 118-140.
Chase, R.B. & Dasu, M.(2001). Want to Perfect Your Company's Service? Use Behavioral Science. *Harvard business review,* June, 78-84.
Chebat, J.C. & Gelinas-Chebat, C. (1995). The impact of mood on time perception. Memorization, and acceptance of waiting. *Genetic, Social & General Psychology Monigraphs 121*(4), 411-425.
Chebat, J.C. & Michon, R. (2003). Impact of ambient odors on mall shoppers' emotions, cognition, and spending. A test of competitive causal theories. *Journal of business Research 56*. 529-539.

Chebat, J.C., Filiatrault, P., Gelinas-Chebat, C. & Vaninsky, A. (1995). Impact of Waiting Attribution and Consumer's Mood on Perceived Quality. *Journal of Business Research, 34*, 191-196.

Chung, E., Beverland, M.B., & Gabbott, M. (2004). *An exploration of consumer forgiveness following marketer failure*. Paper presented at the ANZMAC 2004 Marketing Accountabilities and Responsibilities, Wellington Australia.

Clemmer E.C., & Schneider, B. (1989). *Towards Understanding and Controlling Customer Dissatisfaction with Waiting,* Working paper 89-115. Cambridge MA: Marketing Science Institute.

Clow, K.E., Kurtz, D.L., Ozment, J. & Ong, B.S. (1997). The antecedents of consumer expectations of services: an empirical study across four industries. *The Journal of Services Marketing*, *11*(4), 230-248.

Corey, L.J., Wallace, M.A., Harris, S.H. & Casey, B. (1986). Psychiatric ward atmosphere. *Journal of Psychological Nursing and Mental Health Services*, *24*, 10-16.

Cox, K. (1964). The responsiveness of Food Sales to Shell Space Changes in Supermarkets. *Journal of Marketing Research 1*(March), 63-67.

Cozby, P.C. (1973). Effects of density, activity, and personality on environmental preferences. *Journal of Research in Personality, 7,* 45–60.

Craik, K.H. (1973). "Environmental Psychology". *Annual Review of Psychology*, *23*, 403-422.

Crawford, F. & Matthews, R. (2001). *The Myths of Excellence, why Great Companies Never Try to Be the Best at Everything*. New York, Crown Business.

Crowley, A.E. (1993). The two-dimensional impact of color on shopping. *Marketing Letters, 4*(1), 59-69.

Csikszentmhalyi, M. (1999). Flow. Psychologie van de optimale ervaring. Boom, Amsterdam.

Curnhan, R.C. (1972). The Relation Between Shelf Space and Unit Sales in Supermarkets. *Journal of Marketing Research* 9. November, 406-412.

Curton E.D., & Lordahl, D.S. (1974). Attentional focus and arousal in time estimation. *Journal of Experimental Psychology*, *103*, 861-867.

Dalkey, N. & Helmer, O. (1963). An Experimental Application of the Delphi Method to the Use of Experts. *Management Science, 9*(3), 458-467.

Darley, J.M. & Gilbert, D. (1985). *Social Psychological Aspects of Environmental Psychology.* Handbook of Social Psychology, 3rd ed., Vol II, Gardner Lindzey and Elliot Aronson, eds. New York: Random House, Inc., 949-91.

Daurat, A., Aguirre, A., Foret, J., Gonnet, P., Keromes, A., & Benoit, O. (1993). Bright light affects alertness and performance rhythms during a 24-h constant routine. *Physiological Behaviour, 53*(5), 929-936.

Davis, M. & Heineke, J. (1993). *Managing the Customer's Experience of Waiting for Service.* Service operations: The design and delivery of effective service operations. R. Johnston & N.D.C. Stack (Eds). Warwick UK. Operations management Association UK, 65-71.

Davis, M. & Maggard, M.J. (1990). An Analysis of Customer Satisfaction with Waiting Times in a Two-Stage Service Process. *Journal of operations management*, *9*(3), 324-334. August.

Davis, M.M. & Heineke, J. (1994). Understanding the roles of the customer and the operation for better queue management. *International Journal of Operations and Production Management*, *14*(5), 21-34.

Davis, M.M. & Heineke, J. (1998). How disconfirmation, perception and actual waiting times impact customer satisfaction. *International Journal of Service Industry Management*, *9*(1), 64-73.

Davis, M.M. & Vollmann, T.E. (1990). A framework for relating waiting time and customer satisfaction in a service operation. *The Journal of Services Marketing*, *4*(1), 61-9.

Davis, M.M. (1991), How long should a customer wait for a service? *Decision Science*, *22*, 421-34.

De Bruyn, M. & De Vries, B. (2009). *Het belang van kwaliteitsaspecten: uitdieping van het klant-wensenonderzoek*. Colloquium "Oog voor de reiziger", 11 september, Driebergen-Zeist.

Debets, L, & Ruitenburg, K. (2010). *Het spoor bijster. Het verminderen van normoverschrijdend gedrag in de trein*. Masterthese, Universiteit Nijmegen

Deci, E.L. (1975). *Intrinsic motivation.* New York: Plenum.

Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behavior.* New York: Plenum.

Dennis, C., Newman, A., Michon, R., Brakus, J.J. & Wright, L.T. (2010). The mediating effects of perception and emotion: Digital signage in mall atmospherics. *Journal of Retailing and Consumer Services, 17,* 205-215.

Derval, D. (2010). *The Right Sensory Mix. Targeting Consumer Product Development Scientifically.* Springer, New York.

Derval, D. (2007). *Wait marketing. Communicate at the right moment at the right place.* Derval Research, Amsterdam.

Derval, D. (2009). *Wait marketing. Is it the Right Moment?* Derval Research, Amsterdam.

Devlin, A.S. (1992). Psychiatric ward renovations: Staff perception and patient behavior. *Environment and Behavior*, *24*, 66-84.

Dickson, J. & Albaum, G. (1977). A Method for Developing Tailormade Semantic Differentials for Specific Marketing Content Areas. *Journal of Marketing Research, 14*, 87-91.

Dijksterhuis, A. (2007). *Het slimme onbewuste. Denken met ons gevoel.* Bert Bakker, Amsterdam.

Dijksterhuis, A., Smith, P.K., Van Baaren, R. & Wigboldus, D. (2005). The Unconscious Consumer: Effects of Consumer Behavior. *Journal of Consumer Psychology, 15*(3): 193-202.

Dijkstra, K. (2009). *Understanding healing environments. Effects of physical environmental stimuli on patients' health and well-being.* Dissertation, Enschede.

Dijkstra, K., Pieterse, M.E. & Pruyn, A.Th.H (2008). Individual differences in reactions towards color in healthcare environments: The role of stimulus screening ability. *Journal of Environmental Psychology, 28*, 268-277.

Dijst, M. & Vidakovic, V., 2000. Travel time ratio: the key factor for spatial reach. *Transportation, 27*(2), 179-199.

Dijst, M.J. (1995). *Het elliptisch leven. Actieruimte als integrale maat voor bereik en mobiliteit.* Dissertatie, Delft.

Dion, D. (2004). Personal control and coping with retail crowding. *International Journal of Service Industry Management*, *15*, 250–263.

Donovan, R. & Rossiter, J. (1982). Store Atmosphere: An Environmental Psychology Approach. *Journal of Retailing*, *58*(spring), 34-57.

Droit-Volet, S. & Meck, W.H. (2007). How emotions colour our perception of time. *Trends in Cognitive Science*, *11*(12), 504-513.

Dube, L., Chebat, J.-C. & Morin, S. (1995). The effects of background music on consumers' desire to affiliate in buyer-seller interactions. *Psychology and Marketing, 12*(4), 305-19.

Dubé-Rioux, L., Schmitt, B.H., & Leclerc, F. (1988). Consumer's reactions to Waiting: When Delays Affect the Perception of Service Quality". *Advances in consumer Research*, *16,* T. Srull, ed. Provo, UT: Association for Consumer Research, 59-63.

Dunlap, J., Loros, J. & DeCoursey, P. (2004). *Chronobiology.* Sunderland, Massachusetts.

Durrande-Moreau, A. & Usunier J.C., (1999). "Time styles and the waiting experience: An exploratory study". *Journal of Service Research, 2*(2), 175-186.

Durrande-Moreau, A. (1994). *Qualiteé de service et perception du temps : l'attente, propositions théoriques et études empiriques*. Thése de Doctorat, Universitée Pierre Mendés-France, Grenoble.

Durrande-Moreau, A. (1997). L'attente d'un service, quelles recommandations? *Décision Marketing*, *11*, 69-79.

Durrande-Moreau, A. (1999). Waiting for service: ten years of empirical research. International. *Journal Of Service Industry Management, 10*, 171-189.

East, R., Lomax, W., & Wilson, G. (1991). Factors associated with service delay in supermarkets and post offices. *Journal of Consumer Satisfaction and Complaining Behavior.* 4, 123-128.

Easterbrook, J.A. (1959). The effect of emotion on cue utilization and the organization of behavior. *Psychological Review, 66*(3), 183-201.

Eroglu, S. & Harrell, G.D. (1986). Retail Crowding: Theoretical and Strategic Implications. *Journal of Retailing, 62*(4), 346-363.

Eroglu, S.A. & K.A. Machleit (1990). An Empirical Examination of Retail Crowding: Antecedents and Consequences. *Journal of Retailing*, *66* (Summer), 201-221.

Eroglu, S.A., Machleit, K.A. & Chebat, J.C. (2005). The Interaction of Retail Density and Music Tempo: Effects on Shopper Responses. *Psychology & Marketing, 22*(7), 577-589.

Eroglu, S.A., Machleit, K.A., & Barr, T.F. (2005). Perceived retail crowding and shopping satisfaction: The role of shopping values. *Journal of Business Research*, *58*, 1146–1153.

Evans, G.W. & Wener, R.E. (2007). Crowding and personal space invasion on the train: Please don't make me sit in the middle. *Journal of Environmental Psychology, 27*, 90-94.

Evans, G.W., Lepore, S.J., & Schroeder, A. (1996). The role of interior design elements in human responses to crowding. *Journal of Personality and Social Psychology, 70*, 41-46.

Eysenck, H.J. (1970). *The structure of Human Personality*. Methuen, London.

Eysenck, H.J. (1941). A Critical and Experimental Study of Colour Preferences. *The American Journal of Psychology, 54*(3), 385-394.

Eysenck, H.J. & Eysenck, M.W. (1985). *Personality and Individual Differences.* Plenum Press, Londen.

Falk, J.H. & Dierking, L.D. (1992). *The Museum Experience*. Whalesback books, Washington D.C.

Farmer, D. (1999). *"Flow& Mihaly Csikszentmihalyi".* Report of Lecture for the University of Technology Sydney, 17 March 1999. http://austega.com?education/articles/flow.htm (consulted on 23 February 2008).

Flaherty M. (1993). Conceptualising variation in the experience of time. *Sociological Inquiry 63*, 394-405.

Flaherty, M. & Meer, M.D. (1994). How time flies: age memory, and temporal compression. *Sociological Quarterly, 35*, 705-721.

Flaherty, M. (1999). *A watched pot: How we experience time*. New York University Press, New York.

Florida, R. (2002). *The rise of the creative class....and how it's transforming work, leisure, community, & everyday life*. Basic Books, New York.

Flow Resulting (2007). *Qualitative research customer values NS*, 2007.

Fog, K., Budtz, C. & Yakaboylu, B. (2005). *Story telling. Branding in practice.* Springer, Berlin/Heidelberg/New York.

Foxall, G.F. & Greenley, G.E. (1999). Consumers' Emotional Responses to Service Environments. *Journal of Business Research, 46,* 149-158.

Fraisse, P. (1963). *The psychology of time*. New York: Harper & Row.

Fraisse, P. (1984). Perception and Estimation of Time. *Annual Review Psychology, 35*, 1-36.

Frank, R.E., Massey, W.F. (1970). Shelf Position and Space Effects on Sales. *Journal of Marketing Research*, *7*(February), 59-66.

Frankenhaueser, M. (1959). *Estimation of time: An experimental study*. Stockholm, Almqvist & Wiksell.

Fraser, J.T. & Soulsbey, M.P. (editors), 1996. *Dimensions of time and life.* The study of time VIII. International University Press, Madison, Connecticut.

Furnham, A. & Allass, K. (1999). The Influence of Musical Distraction of Varying Complexity on the Cognitive Performance of Extroverts and Introverts. *European Journal of Personality, 13*, 27-38.

Gardner, M.P. & Siomkos, G.J. (1986). Towards a Methodology for Assesing Effects of In-Store Atmospherics. *Advances in Consumer Research*, *13*, Richard J. Lutz, ed. Ann Arbor, MI: Association for Consumer Research, 27-31.

Gardner, M.P. (1985). Mood States and Consumer Behavior: A Critical Review. *Journal of Consumer Research, 12*(December), 281-300.

Garlin, F.V. & Owen, K. (2006). Setting the tone with the tune: A meta-analytic review of the effects of background music in retail settings. *Journal of business research, 59,* 755-764.

Gharbi, J.E. & Nantel, J. (2005). *Shopping on the Internet, time and decision-making process*. In search of Time: A conference on methodologies and recent developments of time research in management and the social sciences. ISIDA, Palermo, May 2003. Cahier de recherché 05, 2005. ISSN 1714-6194.

Gifford, R. (1988). Light, decor, arousal, comfort and communication. *Journal of Environmental Psychology, 8*, 177-189.

Gilboa, S. & Rafaeli, A. (2003). Store environment, emotions and approach behaviour: applying environmental aesthetics to retailing.*The International Review of Retail, Distribution and Consumer Research, 13*, 195-211.

Gilliland, A.R., Hofheld, J. & Eckstrand, G. (1946). Studies in time Perception. *Psychological Bulletin*, *43*, 162-176.

Gilmore, J.H. & Pine, B.J. (2007). *Authenticity. What consumers really want*. Harvard Business School Press, Boston, Massachusetts.

Gladwell, M. (2005). Blink, The Power of Thinking Without Thinking. Little, Brown and Company, New York.

Golden, L.G. & Zimmerman, D.A. (1986). *Effective Retailing*. Boston, MA: Houghton Mifflin.

Goldfarb, J.L. & Goldstone, S. (1963). Time judgment: A comparison of filled and unfilled durations. *Perceptual and Motor Skills*, *16*, 376.

Golledge, R.G. (1987). *Environmental Cognition.* Handbook of Environmental Psychology, Vol. 1, Daniel Stokols and Irwin Altman, eds. New York: John Wiley & Sons, Inc. 131-74.

Gorn, G.J., Chattopadhyay, A., Sengupta, J. & Tripathi, S. (2004). Waiting for the Web: How Screen Color Affects Time Perception. *Journal of Marketing Research, 41*(2), 215–225.

Gosling, S.D., Vazire, S., Srivastava, S. & John, O.P. (2004). Should We Trust Web-Based Studies? A Comparative Analysis of Six Preconceptions About Internet Questionnaires. *American Psychologist, 59*(2), 93-104.

Gourville, J.T. (2006). Eager Sellers, Stony Buyers. Understanding the Psychology of New- Product Adoption. *Harvard Business Review,* June, 99-106.

Gray, C. (1982). Duration of differences. Attentional demand or time error? *Perception, 11*, 97-101.

Greenberger, D. Strasser, S. & Cummings, L.D.R. (1989). The Impact of Personal Control on Performance and Satisfaction. *Organisational Behavior of Human Processes, 43*, 29-51.

Greenland, S.J. & McGoldrick, P.J. (1994). Atmospherics, attitudes and behaviour: modeling the impact of designed space. *International Review of Retail, Distribution and Consumer Research, 4*. 1-16.

Grewe, O., Nagel, F., Kopiez, R. & Altenmüller, E. (2007). Emotions Over Time: Synchronicity and Development of Subjective, Physiological, and Facial Affective Reactions to Music. *Emotion, 7*(4), 774-788.

Griffitt, W. (1970). Environmental Effects on Interpersonal Affective Behavior: Ambient Effective Temperature and Atraction. *Journal of Personality and Social Psychology, 15*(3), 240-244.

Grotenhuis, J.W., Wiegmans, B.W. & Rietveld, P. (2007). The desired quality of integrated multimodal travel information in public transport: Customer needs for time and effort savings. *Transport Policy*, *14,* 27-38.

Groth, M., Gilliland, S.W. (2006). Having to Wait for Service: Customer reactions to Delays in Service Delivery. *Applied psychology: an international review, 55*(1), 107-129.

Grönroos, C. (1998). Marketing services: the case of a missing product. *Journal of business & industrial marketing, 13*(4/5), 322-338.

Guilford, J.P. & Smith, P.C. (1959). A system of color preferences. *American Journal of Psychology, 72*(4), 487-502.

Gulas, C. & Schewe, C. (1994). Atmospheric Segmentation: Managing Store Image with Background Music. *Enhancing Knowledge Development in Marketing.* R. Acrol and A. Mitchell, eds., American Marketing Association, Chicago, IL, 325-330.

Harell, G.D. & Hutt, M.D. (1976). Crowding in Retail Stores. *MSU Business Topics* (Winter), 33-9.

Harrell, G.D., Hutt, M.D., & Anderson, J.C. (1980). Path analysis of buyer behavior under conditions of crowding. *Journal of Marketing Research, 17,* 45–51.

Hart, C.W.L., Heskett, J.L., & Sasser Jr, W.E. (1990). The profitable art of service recovery. *Harvard Business Review, 68*(4), 148-156.

Harvey, J.H. & Weary, G. (1984). Current Issues in Attribution Theory and Research. *Annual Review of Psychology*, *35*, 427-459.

Hebb, D.O. (1955). Drives and the C.N.S. (Conceptual Nervous System). *Psychological Review, 62*, 243-254.

Heckler, S. & Childers, T.C. (1992). The role of expectancy and relevancy in memory for verbal and visual information: What is incongruency? *Journal of Consumer Research, 18*, 475-492.

Helson, H. (1964). *Adaption-level theory.* New York: Harper and Row.

Herrington, J.D. & Capella, L.M. (1996). Effects of music in service environments: a field study. *The journal of services marketing, 10*(2), 26-41.

Herzberg, F., Mausner, B. & B.B. Snyderman (1959). *The motiovation to work* (2nd ed.) New York. John Wiley & Sons.

Hess, D.B., Brown, J. en Shuop, D. (2004). Waiting for the bus. *Journal of Public Transportation, 7*(4), 67-84.

Hicks, R.E. & Brandige, R. (1974). Judgment of temporal duration while processing verbal and physiognomic stimuli. *Acta Psychologica*, *38*, 447-453.

Hirsch, IJ. (1956). The effects of auditory and visual background on apparent duration. *American Journal of Psychology, 69*, 561-574.

Hogan H.W. (1978). A theoretical reconciliation of competing views of time perception. *American Journal of Psychology 91*(3), 417-428.

Holahan, C.J. (1982). *Environmental Psychology*. New York: Random House Inc.

Holahan, C.J. (1986). *Environmental Psychology.* Annual Review of Psychology, 381-407.

Holland, R.W., Hendriks, M. & Aarts, H. (2005). Smells like clean spirit. *Psychological Science*, *16*, 689-693.

Hopkinson, R.G., Petherbridge, P. & Longmore, J. (1966). *Daylighting*: Heinemann, London.

Hornik, J. (1982). Situational Effects on the Consumption of Time. *Journal of Marketing*, *46* (Fall), 44-55.

Hornik, J. (1984). Subjective vs objective time measures: a note on the perception of time in consumer behavior. *Journal of Consumer Research*, *11*, 615-18.

Hornik, J. (1992). Time Estimation and Orientation Mediated by Transient Mood. *Journal of Socio-Economincs, 21*(3), 209-227.

Hornik, J. (1993). The role of Affect in Consumer's Temporal Judgments. *Psychology & Marketing*, *10*(3), 239-255.

Houston, M.B., Bettencourt, L.A. & Wegner, S. (1998). The relationship between waiting in an service queue and evaluations of service quality: a field theory perspective. *Psychological Mark,15*(8): 735-753.

Huang, B. and Claramunt, C., (2005). Spatiotemporal Data Model and Query Language for Tracking Land Use Change. *Transportation Research Record*, 107-113.

Huffman, C. & Khan, B.E. (1998). Variety for sale; mass customization or mass confusion? *Journal of retailing,74*(4), 491-513.

Hui, M.K. & Bateson, J.E.G. (1991). Perceived Control and the Effects of Crowding and Consumer Choice on the Service Experience. *Journal of Consumer Research,* 18(2), 174-84.

Hui, M.K. & Zhou, L. (1996). How does waiting duration information influence customers' reactions to waiting for services? *Journal of Applied Social Psychology*, *26*, 1702-1717.

Hui, M.K. &. Tse, D.K. (1996). What to tell Consumers in Waits of Different Lengths: An Integrative Model of Service Evaluation. *Journal of Marketing, 60*(April), 81-90.

Hui, M.K.& Bateson, J.E.G. (1992). The Ecological Validity of Photographic Slides and Videotapes in Simulating the Service Setting. *Journal of consumer research.* 19(September), 271-281.

Hui, M.K., Dube, L. & Chebat, J.C. (1997). The Impact of Music on Consumers' Reactions to Waiting for Services. *Journal of retailing, 73*(1), 87-101.

Hui, M.K., Thakor, M.V. & Gill, R. (1998). The effect of delay type and service stage onconsumers' reactions to waiting. *Journal of Consumer Research*, *24*(March), 469-79.

Hui, M.K., Tse, A.C. & Zhou, L (2006). Interaction between two types of information on reactions to delays. *Market Lett*, 151-162.

Huisman, D., Kroon, L.G., Lentink, R.M. & Vromans, M.J.C.M. (2005). Operations Research in Passenger Railway Transportation. *Statistica Neerlandica*. *59*(4), 467-497.

Huizingh, E. (2006). *Inleiding SPSS 12 voor Windows.* Academic Service, Sdu uitgevers bv, Den Haag.

Ittelson, W.H., Proshansky, H.M., Rivlin, L.G. & Winkel, G.H. (1974). *An Introduction to Environmental Psychology.* New York: Holt, Rinehart & Winston, Inc.

Jacobs, K.W. & Suess, J.F. (1975). Effects of four psychological primary colors on anxiety state. *Percept Mot Skills, 41*(1), 207-210.

James, W. (1890). The perception of time. *The Principles of Psychology*, 605-642. Henry Holt. New York.

Jensen, R. (1999). *The Dream society. How the coming shift from information to imagination will transform your business.* McGraw-Hill, USA.

Johnston, R. (1985). The determinants of service quality: Satisfiers en dissatisfiers. *International Journal of Service Industry Management, 6*, 53-71.

Jung, C. (1959). *Archetypes and the Collective Unconscious.* Europe, Bollingen Series XX.

Kallman, W.M., & Isaac, W. (1977). Altering arousal in humans by varying ambient sensory conditions. *Percept Mot Skills, 44*(1), 19-22.

Kaltcheva, V.D. & Weitz, B.A. (2006). When Should a Retailer Create an Exciting Store Environment? American Marketing Association; *Journal of Marketing,* 70,1007-118.

Kaplan, S. & Kaplan, R. (1982). *Cognition and Environment.* New York: Praeger Publishers.

Kardes, F.R. (1996) In defense of experimental consumer psychology. *Journal of Consumer Psychology 5*(3), 279–96.

Katz, K., Larson, B. & Larson, C.R. (1991). Prescriptions for the waiting in line blues: entertain, enlighten and engage. *Sloan Management Review*, Winter, 44-53.

Keizer, K.E., Lindenberg, S. & Steg, L. (2008). The Spreading of Disorder. *Science 322*, 1681-1685.

Kellaris, J.J. & Altsech, M.B. (1992). The experience of time as a function of musical loudness and gender of listener. *Advances in Consumer Research, 19*, 725-729.

Kellaris, J.J. & Kent, R.J. (1991). Exploring tempo and modality effects on consumer responses to Music. *Advances in Consumer Research, 18*, 243-248.

Kellaris, J.J. & Kent, R.J. (1992). The Influence of Music on Consumers' Temporal Perceptions: Does Time Fly When You're Having Fun? *Journal of consumer psychology, 1*(4), 365-376.

Kellaris, J.J. & Kent, R.J. (1994). An Exploratory Investigation of Responses Elicited by Music Varying in Tempo, Tonality, and Texture. *Journal of consumer psychology 2*(4), 381-401.

Kellaris, J.J.& Mantel, R.J. (1996). Shaping time perceptions with background Music: the effect of congruity and arousal on estimates of ad durations. *Psychology & Marketing, 13*(5), 501-515.

Kellaris, J.J., Mantel, R.J. & Altsech, M.B. (1996). Decibels, Dispositions, and Duration: The Impact of Musical Loudness and Internal States on Time Perceptions, K. Corfman and J. Lynch (Eds.). *Advances in Consumer Research: 23*, Provo, UT: Association for Consumer Research, 498-503.

Kelly, K. (1997). New Rules for the New Economy. *Wired, 5*(9), 1997.

Kent, R.J. & Kellaris, J.J. (2001), "Competitive Interference Effects in Memory for Advertising: Are Familiar Brands Exempt?" *Journal of Marketing Communications*, 7 (3), 159-169.

Klapp, O.E. (1986). *Overload and Boredom.* New York: Greenwood Press.

Klein, S. (2007). *Tijd, een gebruiksaanwijzing.* Ambo, Amsterdam

Klaase, D. & G.J. Peek (2000). Intelligente knooppunten voor de netwerkeconomie. *Real Estate Magazine, 3*, 33-38.

Knippenberg, H. & De Pater, B.C. (1988). *De eenwording van Nederland.* Sun, Nijmegen.

Konijnendijk, T. & Van Beek, P. (2008). *Klantoordelen opnieuw onderzocht en gerubriceerd.* Colloquium Vervoersplanologisch Speurwerk. Vroeger was de toekomst beter. 20 en 21 november 2008, Santpoort, Nederland.

Kotler, P. & Stonich, P.J. (1991). Turbo Marketing Trough Time Compression. *The Journal of Business Strategy*, September/Oktober.

Kotler, P. (1973). Atmospherics as a marketing tool. *Journal of Retailing, 49* (Winter), 48-64.

Kotzan, J.A., Evanson, R.V. (1969). Responsiveness of Drug Store Sales to Shelf Space Allocations. *Journal of Marketing Research, 6*(November), 465-469.

Kraut, R.E., Olson, J., Banaji, M., Bruckman, A., Cohen, J., & Couper, M. (2003). *Psychological research online: Opportunities and challenges.* Report prepared for the American Psychological Association's Taskforce on the Internet and Psychological Research. Retrieved August 28, 2003, from http://www-2.cs.cmu.edu/afs/cs.cmu.edu/user/kraut/ www/RKraut.site.files/articles/kraut03-PsychologicalResearchOnline.pdf

Kraut, R., Patterson, V., Lundmark, M., Kiesler, S., Ukophadhyay, T., & Parthasarathy, K. & Kumar, P. (2002), "Self–Other Discrepancies in Waiting Time Decisions," *Organizational Behavior and Human Decision Processes*, *87*(March), 207-226.

Kroon, L.G., Huisman, D. & Maroti, G. (2008). Optimisation Models for Railway Timetabling. In I.A. Hansen & J. Pachl (Eds.), *Railway Timetable and Traffic* (pp. 135-154). Hamburg: Eurailpress.

Kroon, L.G., Maroti, G., Retel Helmrich, M.J., Vromans, M.J.C.M. & Dekker, R. (2008). Stochastic improvement of cyclic railway timetables. *Transportation Research. Part B, Methodological, 42*(6), 553-570.

KTO, Klanttevredenheidsonderzoek, 2009 (Customer Satisfaction Survey, 2009).

Küller, R., Ballal, S., Laike, T., Mikellides, B. & Tonello, G. (2006). The impact of light and colour on psychological mood: a cross-cultural study of indoor work environments. *Ergonomics, 49*(14), 1496-1507.

Lammers, H.B. (2003). "An oceanside field experiment on background music effects on the restaurant tab." *Percept Mot Skills, 96*(3 Pt 1), 1025-1026.

Lang, A. (2000). The Limited Capacity Model of Mediated Message Processing. *Journal of Communication,* Winter, 46-70.

Lang, A. (2006). Using the Limited Capacity Model of Motivated Mediated Message Processing to Design Effective Cancer Communication Messages. *Journal of Communication. 56,* 57-80.

Langer, E.J. & Saegert, S. (1977). Crowding and Cognitive Control. *Journal of Personality and Social Psychology, 35*(3), 175-182.

Larson, C.R. (1987). Perspectives on Queues: Social Justice and the Psychology of Queuing. *Operation Research, 35* (6), 895-905.

Larson, C.R. (1988). There is more to a line than it's Wait. *Technology Review, 91* (July), 60-62).

Lawrence, C., Andrews, K. (2004).The influence of perceived prison crowding on male inmates' perception of aggressive events. *Aggressive Behavior, 30*(4), 273-283.

Lawson, R. (1965). *Frustration.* New York: The MacMillan Company.

Lazarus, R.S., (1982). Thoughts on the relations between emotion and cognition. *American Psychologist*, *37*, 1019-1024.

Lejeune H. & Wearden, J.H. (2009). Vierordt's The experimental study on time sense (1868) and his legacy. *European Journal of Cognitive Psychology,* 21(6), 941-960.

Leong, S.M., Ang, S.H. & Low, L.H.L. (1997). Effects of physical environment and locus of control on service evaluation. *Journal of retailing and Consumer Services*, *4*(4), 231-237.

Lewin, K. (1943). Defining the field at a given time. *Psychological Review, 50*, 292-310.

Lin, I.Y. (2004). Evaluating a servicescape: the effect of cognition and emotion. *Hospitality Management, 23,* 163-178.

Lindstrom, M. (2005). *Brand sense. How to build powerfull brands through touch, taste, smell, sight & sound?* Free Press, new York

Lindstrom, M. (2008). *Buy-ology. Truth and lies About Why We Buy.* Doubleday, New York.

Loehlin, J. (1959). The influence of different activities on the apparent length of time. *Psychological Monographs*, *73*(4). In: Osuna, 1985.

Loomis, J., Blascovich, J. & Beall, A. (1999). Immersive virtual environment technology as a basic research tool in psychology. *Behavior Research Methods, Instruments, & Computers, 31,* 557–564.

Lotz, S.L., Eastlick, M.A., Mishra, A. & Shim, S. (2010). Understanding patrons' participation in activities at entertainment malls. A study in "flow". *International Journal of Retail & Distribution Management, 38*(6), 402-422.

Luo, W., M.J. Liberatore, R.L. Nydick, Q.B. Chung & E.Sloane (2004). Impact of process change on customer perception of waiting time: a field study. *Omega, 32*, 77-83.

M.A., Baker, J. Peterson, M. & Braunsberger, K. (2003). The effects of music, wait-length evaluation, and mood on a low-cost wait experience. *Journal of Business Research, 56,* 421-430.

Macar, F., Grondin, S. & Casini, L. (1994). Controlled attention sharing influences time estimation. *Memory & Cognition, 22*, 673-686.

Machleit, K.A. & Eroglu, A. (2000). Describing and Measuring Emotional Response to Shopping Experience. *Journal of Business Research, 49*, 101-111.

Machleit, K.A., Eroglu, S.A. & Mantel, S.P. (2000). Perceived Retail Crowding and Shopping Satisfaction: What Modifies This Relationship? *Journal of Consumer Psychology, 9*(1), 29-42.

Machleit, K.A., Kellaris, J.J. & Eroglu, S.A. (1994). Human versus spatial dimensions of crowding perceptions in retail environments: A note on their measurement and their effect on shopper satisfaction. *Marketing Letters*, *5*, 183–194.

Mackie, P.J., Fowkes, A.S, Wardman, M., Whelan, G. & Bates J. (2001). *Values of travel time savings in the UK.* Leeds, Institute for Transport Studies, University of Leeds.

Magnini, V.M., Parker, E.E. (2009). The psychological effects of music: Implications for hotel firms. *Journal of Vacation Marketing*, *15*(1), 53-62.

Maister, D.H. (1985). *The psychology of waiting lines*. Reprinted by permission of the publisher from *The service encounter,* edited by John A. Czepiel. Michael R. Solomon and Carol F. Surprenant (Lexington, Mass.: Books, D.C. Heath and Company. Copyright 1985 D.C. Heath and Company.

Mann, L. & Taylor, K.F. (1969). Queue counting: the effect of motives upon estimates of number in waiting lines. *Journal of Personality and Social Psychology*, *12*(2), 95-103.

Mann, L. (1970). The Social Psychology of Waiting Lines. *American Scientist*, *58*, 390-398.

Markin, R.J., Lillis, C.M., & Narayana, C.L. (1976). Social psychological significance of store space. *Journal of Retailing, 52*(1), 43-54.

Maslow, A.H. (1954). *Motivation and personality.* New York, Harper & Brothers.

Massara, F., Liu, S.S. & Melara, R.D. (2010). Adapting to a retail environment: Modeling consumer-environment interactions. *Journal of Business Research, 63*, 673-681.

Matilla, A.S. & Wirtz, J. (2001). Congruency of scent and music as a driver of in-store evaluations and behavior. *Journal of Retailing, 77*, 273-289.

Maxham, I. & James, G. (2001). Service recovery's influence on consumer satisfaction, positive word-of-mouth, and purchase intentions. *Journal of Business Research, 54*(1), 11-24.

Mayer, J.D., Gaschke, Y.N., Braverman, D.L. & Evans, T.W. (I 992). Mood-congruent judgment is a general effect. *Journal of Personality and Social Psychology, 63,* 119-132.

McElrea, H.S.L. & Standing, L. (1992). "Fast music causes fast drinking." *Perceptual and Motor Skills, 75,* 362.

Mehrabian, A. & Russell, J.A. (1974). An approach to environment Psychology, Cambridge. MA: *Journal of Marketing, 46*(2), 86-91.

Mehrabian, A. (1976). *Public Spaces and Private Spaces: The Psychology of Work, Play and Living Environments*. New York: Basic Books, Inc.

Meyer, T. (1992). Subjective Importance of Goal and Reactions to Waiting in Line. *The Journal of Social Psychology, 134*(6), 819-827.

Michon, R., Chebat, J.C. & Turley L.W. (2005). Mall Atmospherics: The Interaction Effects of the Mall Environment on Shopping Behavior. *Journal of Business Research, 58*, 576-583.

Mieras, M. (2007). *Ben ik dat? Wat hersenonderzoek vertelt over onszelf.* Nieuw Amsterdam.

Milgram, S. (1970). The experience of living in cities, *Science, 167,* 1461-1468.

Milliman, R.E. (1982). Using background music to affect the behavior of supermarket shoppers. *Journal of Marketing, 46*, 86-91.

Milliman, R.E. (1986). The Influence of Background Music on the Behavior of Restaurant Patrons. *Journal of Consumer Research, 13*(September), 286-289.

Mills, R.T. & Krantz, D.S. (1979). Information, choice, and reactions to stress: A field experiment in a blood bank with laboratory analogue. *Journal of Personality and Social Psychology, 37*(4), 608–620.

Mitchell, D.J., Kahn, B.E. & Knasko, S.C. (1995). There's something in the air: Effects of Congruent or Incongruent Ambient Odor on Consumer Decision Making. *Journal of Consumer Research. 22,* 229-238.

Miwa, Y. & Hanyu, K. (2006). The Effects of Interior Design on Communication and Impressions of a Counselor in a Counseling Room. *Environment and Behavior, 38*(4), 484.

Mo, S.S. (1971). Judgment of temporal duration as a function of numerosity. *Psychonomic Science, 24*(2), 67-68.

Moreau, A. (1992). Public transport waiting times as experienced by customers, marketing research involving the Grenoble system. *Public transport international*, 41(3), 52-68.

Morris, J.D. (1995). SAM: The Self-Assesment Manikin. An Efficient Cross-Cultural Measurement Of Emotional Response. *Journal of Advertising Research,* November/December.

Morrison, M., Gan, S., Dubelaar, C. & Oppewal, H. (2010). In-store Music and aroma influences on shopper behavior and satisfaction. *Journal of Business Research,* forthcoming, doi:10.1016/j.jbusres.2010.06.006.

Need, Y. & Nieuwenhuis, K. (2003). *Beleving van tijd en wachten in het verkeer, een literatuurscan.* Uitgave van directoraat generaal Rijkswaterstaat, wegen naar de toekomst.

Newman A., Dennis C.E. & Zaman, S., (2006). Marketing images and consumer' experiences in selling environments. *Marketing Management Journal* (Fall), 515-599.

Nie, W. (2000). Waiting: integrating social and psychological perspectives in operations management. *Omega*, *28*(6), 611-628.

Nijs, D. & Peters, F. (2002). *Imagineering. Het creëren van belevingswerelden.* Amsterdam.

North, A.C., Shilcock, A. & Hargreaves, D.J. (2003). ''The effect of musical style on restaurant customers' spending,'' *Environment and Behaviour, 35*, 712-718.

North, A.C. & Hargreaves, D.J. (1998). The Effect of Music on Atmosphere and Purchase Intentions in a Cafeteria. *Journal of Applied Social Psychology, 28*(24), 2254-2273.

North, A.C., Hargreaves, D.J. & McKendrick, J. (1999). The Influence of In-Store Music on Wine Selections. *Journal of Applied Social Psychology, 84*(2), 271-276.

NS Poort (2010). *Van overstapmachine naar dynamisch stadsportaal, Proefstation Leiden.* Utrecht. (From transfer point to dynamic city entrance, pilot station Leiden)

NS Visie op Stations (2006). *Van overstapmachine naar dynamisch stadsportaal*. Utrecht, NS stations, NS Commercie, HSA.

Oakes, S. & North, A.C. (2008). Reviewing congruity effects in the service environment musicscape. *International Journal of Service Industry Management, 19*(1), 63-82.

Oakes, S. (2000). The influence of the musicscape within service environments. *Journal of services marketing, 14*(7), 539-556.

Oakes, S. (2003). Musical Tempo and Waiting Perceptions. *Psychology and Marketing, 20*(8), 685-705.

Okoli, C. & Pawlowski, S.D. (2004). The Delphi method as a research tool: an example, design considerations and applications. *Information & Management, 42,* 15–29.

Ornstein, R.E. (1969). *On the experience of time*. Penguin books. Baltimore Md.

Ornstein, S. (1986). Organizational Symbols: A Study of Their Meanings and Influence on Perceived Psychological Climate. *Organizational Behavior and Human Decision Processes 38*, 207-229.

Ornstein, S. (1992). First Impressions of the Symbolic Meanings Connoted by Reception Area Design. *Environment and behavior*, *24*(1), 85-110.

Osuna, E.E. (1985). The Psychological Cost of Waiting. *Journal of mathematical psychology*, *29*, 82-105.

Ozdemir, A. (2010). The effect of window views' openness and naturalness on the perception of rooms' spaciousness and brightness: A visual preference study. *Scientific Research and Essays, 5*(16), 2275-2287.

Pallant, J. (2007). *SPSS Survival Manual. A Step-by-Step Guide to Data Analysis using SPSS for windows.* Mc Graw Hill, Open University Press, Sydney.

Peek, G.J & Van Hagen, M. (2006). Maak het snel mooier. *Nova Terra, 6*(2), 31-35.

Peek, G.J. & Van Hagen, M. (2002). Creating Synergy in and around stations: three strategies. Transport Research Board, *Journal of Transportation Research Record*, *1793*, 1-6.

Peek, G.J. & Van Hagen, M. (2003). What you want is what you should get: customer's whishes in relation to the redevelopment of inner-city railway stations areas. *European Transport Congerence,*4-7 October, Strasbourg.

Peek, G.J. & Van Hagen, M. (2004). *Één verbinding is géén verbinding.* Colloquium Vervoersplanologisch Speurwerk. Innovatie: van inspiratie naar realisatie? 25 en 26 november, Zeist, The Netherlands.

Peek, G.J. (2006). *Locatiesynergie, een participatieve start van de herontwikkeling van binnen-stedelijke stationslocaties*. Dissertatie, Eburon, Delft.

Peters, P. (2003). *De haast van Albertine. Reizen in de technologische cultuur: naar een theorie van passages.* Dissertatie, De Balie, Amsterdam.

Piët, S. (2004). *De emotiemarkt. De toekomst van de beleveniseconomie*. Pearson Education, Benelux.

Pijls-Hoekstra & De Munck Mortier, E. (2005). *Stationsbeleving blijkt meetbaar.* Colloquium Vervoersplanologisch Speurwerk. Duurzame mobiliteit: Hot or not? 24 en 25 november, Antwerpen.

Pine, B.J. & Gilmore, J.H. (1999). *The Experience Economy. Work Is Theatre & Every Business a Stage.* Boston, Harvard Business School Press.

Pons, F. & Laroche, M. (2007) 'Cross-cultural differences in crowd assessment', *Journal of Business Research*, *60*, 269-276.

Pons, F., Laroche, M. & Mourali, M. (2006). Consumer Reactions to Crowded Retail Settings: Cross-Cultural Differences between North America and the Middle East. *Psychology & Marketing, 23*(7), 555-572.

Postma, P. & Bruel M. (2006). *De Gelukswinkel. Over het binden en boeien van klanten.* Scriptum.

Poynter, D.G. & Homa, D. (1983). Duration judgment and the experience of change. *Perception and Psychophysics*, *33*, 548-560.

Poynter, D.G. (1983). Duration judgment and the segmentation of experience. *Memory & Cognition*, *11*, 77-82.

Poynter, D.G. (1989). Judging the Duration of Time Intervals: A process of Remembering Segments of Experience. In: *Time and Human Cognition. A Life-Span perspective*. I. Levin and D. Zakay (Editors). Elsevier Science Publishers B.V., North Holland.

Preston, J., Blainey, S., Wall, G.S., Wardman, M. & Chintakayala, P., Heywood, C. & Sheldon, R.(2008). *The effects of station enhancements on rail demand.* European Transport Conference, 6-8 October 2008 Noordwijkerhout, The Netherlands.

Priestly J.B. (1968). *Man and Time.* Dell Books, New York.

Pruyn A.T.H. & Smidts, A. (1993). De psychologische beleving van wachtrijen. *Management report series* 126. In: *tijdschrift voor Marketing* september en oktober.

Pruyn, A.T.H. & Smidts, A. (1998). Effects of waiting on the satisfaction with the service: Beyond objective time measures. *International Journal of Marketing, 15*, 321-334.

Pruyn, A.T.H. & Smidts, A. (1992). Customers' evaluations of queues: three exploratory studies, papier de recherche. Published in 1993 with the same title in Van Raay, W.F. and Bamossy, G. (Eds), *European Advances in Consumer Research*, *1*, 371-82.

Pruyn, A.T.H. & Wilke, H. (2001). *Sociale psychologie voor managers.* Bohn Stafleu Van Loghum, Houten/Diegem.

Pruyn, A.T.H.& Smidts, A. (1999). Customer's Reaction to waiting: Effects of the presence of "fellow sufferers" in the waiting room. *Advances in Customer Research, 26,* 211-216.

Pruyn, A.T.H., Smidts, A., & Dijke, L.J. van (1999). Understanding the dynamics of customer experiences throughout extended services processes. In: L.Hildebrandt & W. Plinke (Eds.), Marketing and Competition in the Information Age. (11-14). Berlin: EMAC.

Putnam, R.D. (2000). *Bowling Alone.* New York, NY: Simon & Schuster.

Rapoport, A. (1982). *The Meaning of the Built Environment*. Beverly Hills, CA: Sage Publications, Inc.

Reeves, B. & Nass, C. (1996). *How People Treat Computers, Television and New Media like Real People and Places.* Cambridge University Press, Stanford, CA.

Reinders, M.J., Dabholkar, P.A. & Frambach, R.T. (2008). Consequences of Forcing Consumers to Use Technology-Based Self Service. *Journal of Service Research, 11*(2), 107-123.

Reinders, M.J., Van Hagen, M. & Frambach, R.T. (2007). Customer evaluations of self-service technologies in public transport. European Transport Congres, 17-19 October, Noordwijkerhout, The Netherlands.

Richins, M.L. (1997). Measuring Emotions in the Consumption Experience. *Journal of Consumer Research, 24*, 127-146.

Ritterfeld, U. & Cupchik, G.C. (1996). Perceptions of interior spaces. *Journal of Environmental Psychology*, *16*, 349-360.

Riva, G. Mantovani, F., Capediville, C.S., Preziosa, A., Morganti, F.& Villani, Gaggioli, A., Botella, C., Alcañiz, M. (2006). Affective Interactions Using Virtual Reality: The Link between Presence and Emotions. *CyberPsychology & Behavior, 10*(1), 45-56.

Roberts, K. (2004). *Lovemarks. The future beyond brands.* Saatchi & Saatchi. Powerhouse Books, New York.

Rowe, G. & Wright, G. (1999). The Delphi technique as a forecasting tool: issues and analysis. *International Journal of Forecasting, 15*, 353–375.

Rudolph, T., Pruyn, A.T.H. & Wagner, T. (2002). *"Die Kasse als Engpassfaktor: Zur Lösung des Warteschlangenproblems im Handel,"* in Erfolg durch Dienen: Beiträge zur wertsteigernden Führung von Dienstleitungsunternehmen, Innsbrucker Kolleg für Unternehmensführung, Band 4, Hans H. Hinterhuber und Heinz K. Stahl, Hrsg. Renningen: Expert, 356-375.

Russell, J.A. & Mehrabian, A. (1977). Evidence for a Three-Factor Theory of Emotions. *Journal of Research in Personality, 11,* 273-294.

Russell, J.A. & Pratt, G. (1980). A Description of the Affective Quality Attributed to Environments. *Journal of Personality and Social Psychology*, *38* (August), 311-322.

Russell, J.A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*, 1161-1178.

Saegert, S.C. (1973). *Crowding, cognitive overload and behavioral constraint.* In: N. Priester (Ed), Environmental design and research. Stroudsburg, PA: Dowden, Hutchinson, & Ross.

Schmitt B.H.(2003). *Experiential Marketing; how to get customers to sense, feel, think, act and relate to Your Company and Brands.* The Free Press, New York.

Schmitt, B.H. (2003). *Customer Experience Management. A revolutionary approach to connect with your customers.* John Wiley & Sons, Inc. Hoboken, New Jersey.

Seawright, K.K. & Sampson, S.E. (2007). A video method for empirically studying wait-perception bias. *Journal of Operations Management, 25*, 1055-1066.

SENTA (2005). *Monitor Integrale Kwaliteit Stations.* Hoofdrapportage fase 2, NS, ProRail. Utrecht.

Sherman, E., Mathur, A., & Smith, R.B. (1997). Store Environment and Consumer Purchase Behavior: Mediating Role of Customer Emotions. *Psychology & Marketing, 14*(4), 361-378.

Siffre, M. (1963). *Hors du temps.* Parijs, 1963.

Singh, S. (2006). Impact of color on marketing. *Management Decision, 44*(6), 783-789.

Sizoo, A. (1940). *Augustinus' Belijdenissen.* Vertaling door A. Sizoo, Meinema, Delft 7de druk.

Skogan, W.G. (1990). *Disorder and Decline: Crime and the Spiral of Decay in American Neighborhoods.* New York: Free Press.

Smets, G. (1969). Time Expression of Red and Blues. *Perceptual and Motor Skills, 29* (August-December), 511-514.

Smidts, A. & Pruyn, A.T.H. (1994). *How waiting affects customer satisfaction with service: the role of subjective variables'*, Proceedings of the 3rd International Research Seminar in Service Management, Université d'Aix-Marseille, pp. 678-696.

Smith, K.C.P. & Apter, M.J. (1977).Collecting Antiques: a psychological interpretation. *Antique Collector, 48*(7), 64-66.

Smith, W.A. (1961). Effects of industrial music in a work situation requiring complex mental activity. *Psychological Reports, 8*, 159-162.

Smiths P.C. & Curnow, R. (1966). "Arousal Hypothesis" and the Effects of Music on Purchasing Behavior. *Journal of Applied Psychology, 50*, 255-256.

Sommer, R. (1969). *Personal Space: The Behavior Basis of Design.* 143-155. Prentice-Hall, Englewood Cliffs, NJ. In: Aubert-Gamet (1997).

Spangenberg, E.A., Crowley, A.E., & Henderson, P.W. (1996). Improving the store environment: Do olfactory cues affect evaluations and behaviors? *Journal of Marketing, 60*(2), 67-80.

Spokane, A.R., Meir, E.I., & Catalano, M. (2000). Person-environment congruence and Holland's theory: A review and reconsideration. *Journal of Vocational Behavior, 57,* 137-187.

Steg, L. & C. Vlek (1999). Autogebruik: must en lust. Instrumenten en affectieve motieven voor autogebruik. Tijdschrift vervoerwetenschap, 4, 303-322.

Steg, L. (2004). Car use: lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A 39*, 147-162.

Stevens, J.P. (2009). *Applied multivariate statistics for the social sciences.* Routledge, New York.

Stokols, D. (1972). On the distinction between density and crowding: some implications for future research. *Psychological Review,* 79(3), 275-277.

Stokols, D. (1978). "Environmental Psychology". *Annual Review of Psychology*, *29*, 235-295.

Stone, N.J. & English, A.J. (1998). Task type, posters, and workspace color on mood, satisfaction, and performance. *Journal of Environmental Psychology, 18*(2), 175-185.

Stratton, V.N. & Zalanowski, A.H. (2003). Daily music listening habits in college students: Related moods and activities. *Psychology and Education, 40*(1), 1-8.

Surprenant, C. & Solomon, M. (1987). Predictability and personalization in the service encounter. *Journal of Marketing, 51*, 86-96.

Sweeney, J.C. & Wyber, F. (2002). The role of cognitions and emotions in the music-approach-avoidance behavior relationship. *Journal of services marketing, 16*(1), 51-69.

Tai, S.H.C. & Fung, A.M.C. (1997). Application of an environmental psychology model to in-store buying behavior. *The International Review of Retail, Distribution and Consumer research 7*(4), 311-337.

Tansik, D.A. & Routhieaux, R. (1996). *Customer stress-relaxation: the impact of music in a hospital waiting room.* Proceedings of the 4th International Research Seminar in Service Management, UniversiteÂ d'Aix-Marseille, pp. 687-703.

Taylor, S. (1990). *Waiting for Services: Consumer Views of the Aversiveness and Duration of Waiting, and Resulting Impact on Specific and Global Service Evaluation*. Dissertation services, UMI.

Taylor, S. (1994). Waiting for services: the relationship between delays and evaluations of service, *Journal of Marketing*, *58*(April), 56-69.

Taylor, S. (1995). The effects of filled time and service provider control over the delay on evaluations of service. In: *Journal of the Academy of Marketing Science*, *23*, 38-48.

Thomas, A.E.C. & Weaver, W.B. (1975). Cognitive processing and time perception. *Perception & Psychophysics*, *16*, 449-458.

Thomas, E.A.C. & Brown, I. (1974). Time perception and the filled-duration illusion. *Perception & Psychophysics*, *16*(3), 449-458.

Thys, G. (2005). *De Passieketen. Hoe echte klantwaarde alleen maar uit hartstocht kan ontstaan.* Speaking Matters, NL.

Tipples, J. (2008). Negative Emotionality Influences the Effects of Emotion on Time perception. *Emotion*, *8*, 127-131.

Tom, G. & Lucey, S. (1997). A Field study Investigating the Effect of Waiting on Customer Satisfaction. *The Journal of psychology, 131*(6), 655-660.

Turley, L.W. & Milliman, R.E. (2000). Atmospheric effects on shopping behavior: A review of the experimental evidence. *Journal of Business Research, 49* (2), 193-211.

Turley, L.W., Fugate, D.L. (1992). The Multidimensional Nature of Service Facilities, Viewpoints and Recommendations. *The Journal of Service Marketing, 6*(3), 37-45.

Ulrich, R.S. (1991). Effects of interior design on wellness: Theory and recent scientific research. *Journal of Health Care Interior Design*, *3*, 97-109.

Umesh, U.N., Pettit, K.L. & Bozman, C.S. (1989). Shopping Model of the Time-Sensitive Consumer. *Decision Sciences*, *20*, 715-729.

Underhill, P. (1999). *Why We Buy. The science of shopping.* Simon & Schuster, New York.

Underwood, G. & Swain, R. (1973). Selectivity of attention and perception of duration. *Perception, 2*, 101-105.

Underwood, G. (1975). Attention and the perception of duration during encoding and retrieval. *Perception*, 7, 191-198.

Unzicker, D.K. (1999). The Psychology of Being Put on Hold: An Exploratory Study of Service Quality. *Psychology & Marketing*, *16*(4), 327-350.

Vaessens, H.J.A.M. (2005). *Synergie op stationslocaties*. Colloquium Vervoersplanologisch Speurwerk. Duurzame mobiliteit: Hot or not? 24 en 25 november, Antwerpen.

Valdez, P. & Mehrabian, A. (1994). Effects of color on emotions. *Journal of Experimental Psychogy: General, 123*(4), 394-409.

Van Beek, P. (2009). *Waardering door de klant. En dan?* Colloquium “Oog voor de reiziger”, 11 september, Driebergen-Zeist.

Van Bommel, W.J.M. & Beld, G.J. Van den. (2003). Werkverlichting: visuele en biologische effecten. *NVVK Info*, februari.

Van Bommel, W.J.M. & Van den Beld, G.J. (2004). Lighting for work: a review of visual and biological effects. *Lighting Research and Technology, 36(*4), 255–269.

Van Bommel, W.J.M. (2001). *Lighting and crime prevention.* Proceedings Luxjunior, Ilmenau, DE.

Van den Heuvel M.G. (1997). *Openbaar vervoer in de Randstad, een systematische aanpak.* Dissertatie. Thesis Publishers, Amsterdam.

Van den Heuvel, M.G. & Goeverden, C.D. van (1993). *De verplaatsingstijdfactor in relatie tot de vervoerwijzekeuze.* Technische Universiteit Delft.

Van den Heuvel, M.G. (1993). VF verovert status van vakterm. *Tijdschrift Openbaar Vervoer 12*, december.

Van Dijk, N. (1996). Altijd in de verkeerde rij. *Natuur & Techniek, 64*(12), 10-21.

Van Hagen M. (2007). *Stormonderzoek*. Interne notitie, Urecht

Van Hagen M. (2009). *How to meet the needs of train passengers? A successful customer segmentation model for public transport.* European Transport Conference, 6-8 October, Noordwijkerhout the Netherlands.

Van Hagen, M. & De Bruyn, M. (2002). *Typisch NS: Elk station zijn eigen rol*. Colloquium Vervoersplanologisch Speurwerk.: De kunst van het verleiden'. 28 en 29 november, Ansterdam.

Van Hagen, M. & Heiligers, M. (2010). *De kracht van data. Onderzoek naar stationsbeleving.* Colloquium "Oog voor de klant", 10 september 2010, Zeist.

Van Hagen, M. & Hulster, G.J. (2009). *On Screen. Film als implementatietool voor reizigers-segmentatie.* Colloquium Vervoersplanologisch Speurwerk. Nietsdoen, ietsdoen en de effectiviteit van beleid. 19 en 20 november, Antwerpen.

Van Hagen, M. & Meurs, H. (1992). *Bereikbaarheidsprofielen van dagattracties.* Colloquium Vervoersplanologisch Speurwerk. Innovatie in verkeer en vervoer. 26 en 27 november, Rotterdam.

Van Hagen, M. & Wissen, L. van (1993). *Dagattracties en vervoermiddelenkeuze: een rationele afweging?* Colloquium Vervoersplanologisch Speurwerk. Grenzen aan de vervoers-planologie. 26 november, Rotterdam.

Van Hagen, M. &. Peek, G.J (2006). Prettiger reizen met de trein. NS-klantwensenpiramide is leidraad voor trein- en stationsomgeving. *Verkeerskunde*, 5(juni), 50-55.

Van Hagen, M. (1997). *Reistijd: een relatief begrip, de betekenis van de verplaatsingstijdsfactor voor NS*. MOAgrafie2, Utrecht, interne rapportage.

Van Hagen, M. (1998). *Op zoek naar de perfecte overstap.* Colloquium Vervoersplanologisch Speurwerk. Sturen met structuren. 12 en 13 November, Amsterdam.

Van Hagen, M. (1999). *Lust- en mustmotieven, MOAgrafie 6*. NSR Marketingonderzoek en advies, (interne notitie).

Van Hagen, M. (2003). *Belevingswaarde Stations, inrichting station en omgeving vanuit de klantwensen.* Colloquium Vervoersplanologisch Speurwerk. No pay, no queue? Oplossingen voor bereikbaarheidsproblemen in steden. Antwerpen, 24 en 25 november.

Van Hagen, M. (2008). Caféminuten gaan sneller dan tandartsminuten. *Verkeerskunde*, 1, 18-21.

Van Hagen, M., & De Gier, M. (2010). *Nut en noodzaak van marktsegmentering in het OV.* Colloquium "Oog voor de klant", 10 september, Driebergen

Van Hagen, M., Boes, E. & Van den Heuvel, E. (2009). *Naar een standaard belevingsinstrument.* Colloquium "Oog voor de klant", 11 september 2009, Driebergen.

Van Hagen, M., De Gier, M. & Visser, J. (2005). *De psychologie van de treinreiziger: Een verken-ning van de behoeften en drijfveren van treinreizigers*. Colloquium Vervoersplanologisch Speurwerk, Duurzame mobiliteit: hot or not? 24 en25 november, Antwerpen.

Van Hagen, M., Galetzka, M. & Pruyn, A.T.H. (2007). *Perception and evaluation of waiting times of Netherlands Railways (NS)*. European Transport Congres, 17-19 October, Noordwijkerhout, The Netherlands.

Van Hagen, M., Galetzka, M. & Sauren, J. (2010). *Kleur & licht op stations. De invloed van kleur en licht op de wachttijdbeleving.* Colloquium Vervoersplanologisch Speurwerk. De stad van straks, decor voor beweging. 25 en 26 november, Roermond, The Netherlands.

Van Hagen, M., Peek, G.J. & Kieft, S. (2000). *"De functie van het station: een visie"*. Colloquium Vervoersplanologisch Speurwerk. Wie betaalt bepaalt, 30 november, 1 december, Amsterdam.

Van Hagen, M., Pruyn, A.T.H., Galetzka, M. & Kramer, J. (2009). *Waiting is becoming fun! The influence of advertising and infotainment on the waiting experience.* European Transport Conference, 6-8 October, Noordwijkerhout, The Netherlands.

Van Hagen, M., Pruyn, A.T.H., Galetzka, M. & Peters, J. (2008). *The influence of colour and light on the experience and satisfaction with a Dutch railway station. Colour and light on the platform: two virtual experiments*. European Transport Conference, 6-8 October, Noordwijkerhout, The Netherlands.

Van Hagen, M., Pruyn, A.T.H., Galetzka, M. & Sauren, J. (2010). *Music at railway stations: the influence of music on waiting experience. Influence of music genre on station and time experience at a virtual station*. European Transport Conference, 11-13 October, Glasgow, Scotland, UK.

Van Houten, H.J. (1986). *Baas in eigen tijd. Naar een autonomer tijdgebruik*. Amersfoort, Giordano Bruno.

Van Meurs, L. & Aristoff, M. (2009). Split-Second recognition: What Makes Outdoor Advertising Work? *Journal of Advertising Research,* March, 82-92.

Van Rompay, T.J.L. & Pruyn, A.T.H. (in press). When visual product features speak the same language: Effects of shape-typeface congruence on brand perception and price expectations. *Journal of Product Innovation Management.*

Van Rompay, T.J.L., Galetzka, M., Pruyn, A.T.H., & Moreno-Garcia, J. (2008). Human and spatial dimensions of retail density: Revisiting the role of perceived control. *Psychology and Marketing, 25*(4), 319-335.

Van Rompay, T.J.L., Pruyn, A.T.H. & Tieke, P. (2009). Symbolic Meaning Integration in Design and its Influence on Product and Brand Evaluation. International Journal of Design, 3(2), 19-26.

Van Wee, B. & Dijst, M. (2002). *Verkeer en vervoer in hoofdlijnen.* Uitgeverij Coutinho, Bussum.

Verderber S. (1986). Dimensions of person-window transactions in the hospital environment. *Environment and Behavior, 18*(4): 450-466.

Verderber, S. & Reuman, D. (1987). Windows, views and health status in hospital therapeutic environments. *The Journal of Architectural and Planning Research*, *4*, 120-133.

Verhoeven, J, W.M., Van Rompay, T.J.L. & Pruyn, A.T.H. (2009a). At Face Value: Visual Antecedents of Impression Formation in Servicescapes. *Advances in Consumer Research, 36*, 233-237.

Verhoeven, J.W.M., Van Rompay, T.J.L. & Pruyn, A.T.H. (2009b). The price façade: Symbolic and behavioral price cues in service environments. *International Journal of Hospitality Management, 28,* 604-611.

Vischer, J.C. (2008). Towards a user-centred theory of the built environment. *Building Research & Information*, *36*(3) 231-240.

Vohs, K.D. & Schmeichel, B.J. (2003). Self-Regulation and the Extended Now: Controlling the Self Alters the Subjective Experience of Time. *Journal of Personality and Social Psychology*, *85*(2), 217-230.

Vroon, P.A. (1970). Effects of Presented and Processed Information on Duration Experience. *Acta Psychology*, *34,* 115-121.

Wakefield, K.L. & Blodgett, J.G. (1994). The Importance of Servicescapes in Leisure Service Settings. *Journal of Services Marketing, 8*(3), 66-76.

Wakefield, K.L. & J.G. Blodgett (1999). Customer Response to Intangible and Tangible Service factors. *Psychology & Marketing, 16*(1), 51-68.

Walsh, B., Craik, K.H. & Price, R.H. (2000). *Person-Environment Psychology. New Directions and Perspectives* (126-132). Second edition. Lawrence Erlbaum Associates.

Walters, J., Apter, M.J. & Svebak, S. (1982). Color preference, Arousal, and the Theory of Psychological Reversals. *Motivation and Emotion*, *6*(3), 193-215.

Ward, J.C. & Barnes, J.W. (2001). Control and affect: the influence of feeling in control of the retail environment on affect, involvement, attitude and behavior. *Journal of Business Research*, *54*(2), 139-144.

Wardman, M. (2004). Public Transport values of time. *Transport Policy*, *11*, 363-377.

Wearden, J.H., O'Rourke, S.C., Matchwick, C., Ming, Z. & Maeers, S. (2010). Task switching and subjective duration. *The Quarterly Journal of Experimental Psychology, 63* (3), 531-543.

Wegner, D.M. (1994). Ironic processes of mental control. *Psychological Review*, *101*, 34-52.

Wegner, D.M. (2002). *The illusion of Conscious Will.* Massachusetts Institute of Technology. Cambridge, Massachusetts.

Weick, M. & Guinote, A. (2010). How long will it take? Power biases time predictions. *Journal of Experimental Social Psychology, 46,* 595-604.

Weiner, B. (1980). A Cognitive (Attributional)-Emotion-Action model of Motivated Behavior. An Analysis of Judgments of Help-Giving. *Journal of Personality and Social Psychology*, 92(4), 186-200.

Weiner, B. (1985). An Attributional Theory of Achievement Motivation and Emotion. *Psychological Review*, *92*, 548-73.

Weiner, B. (2000). Reflections and Reviews. Attributional Thoughts about Consumer Behavior. *Journal of Consumer research*, *27*(December), 382-387.

Westbrook, R.A. & Black, W.C. (1985). A Motivation-Based Shopper Typology. *Journal of Retailing, 61* (spring), 78-103.

Wexner, L.B. (1954). The degree to which colors (hues) are associated with mood-tones. *Journal of Applied Psychology, 38*(3), 432–435.

White, R.W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review, 66,* 297–333.

Wiers, R. (2007). Slaaf van het onbewuste. Over emotie, bewustzijn en verslaving. Bert Bakker, Amsterdam.

Wijk, M. & Luten, I. (2001). *Tussen mens en plek. Over de ergonomie van de fysieke omgeving.* DUP Blue Print, Delft.
Wilson, G.D. (1966). Arousal properties of red versus green. *Perceptual and Motor Skills, 23*(3), 947-949.
Wilson, J.Q. & Kelling, G.L. (1982). Broken windows. The police and neighborhood safety. *Atlantic Monthly, 249*, 29-38.
Wilson, T.D. (2002). *Strangers to Ourselves. Discovering the adaptive unconscious*. Belknap Harvard, Cambridge, Massachusetts.
Wirtz, J. & Bateson, J.E.G. (1999), "Consumer Satisfaction with Services: Integrating the Environmental Perspective in Services Marketing into the Traditional Disconfirmation Paradigm," *Journal of Business Research, 44*(1), 55-66.
Wirtz, J., Matilla, A.S. & Tan, R.L.P. (2000). The Moderating Role of Target-Arousal on the Impact of Affect on Satisfaction—An Examination in the Context of Service Experiences. *Journal of retailing, 76*(3), 347-365.
Wolf, M.J. (1999). *The entertainment economy. How mega-media forces are transforming our lifes*. Time Books, New York.
Woodrow, H. (1951). *Time perception.* In S.S. Stevens (Ed.), Handbook of experimental psychology (pp. 1224-1236), New York: Wiley.
Wundt, W. (1910). *Principles of physiological psycology*. Macmillan, New York.
Yalch, R.F. & Spangenberg, E. (1990). Effects of store music on shopping behavior. *The journal of consumer marketing, 7*(2), 55-63.
Yalch, R.F. & Spangenberg, E.R. (1993). Using store music for retail zoning: a field experiment. *Advances in Consumer Research, 20*, 632-636.
Yalch, R.F. & Spangenberg, E.R. (2000). The Effects of Music in a Retail Setting on Real and Perceived Shopping Times. *Journal of Business Research, 49*, 139-147.
Yoo, C., Park, J. & Macinnis, D.J. (1998). Effects of Store Characteristics and In-Store Emotional Experiences on Store Attitude. *Journal of Business research*, *42*, 253-263.
Zajonc, R.B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, *35,* 151-175.
Zakay, D. & Block, R.A. (1997). Temporal Cognition. *Current Directions in Psychological Science*. 6(1), 12-16.
Zakay, D. & Fallach, E. (1984). Immediate and remote time estimation – a comparison. *Acta Psyhologica, 57,* 69-81.
Zakay, D. & Feldman, T. (1991). *The role of segmentation and storage size in retrospective time estimation.* Unpublished manuscript. Tel Aviv University. Geciteerd uit: Zakay, D. en Hornik, J. (1991). How much time did you wait in line? A time perception perspective.
Zakay, D. & Hornik, J. (1991). *How much time did you wait in line? A time perception perspective,* in Chebat, J.C. and Venkatesan, V. (Eds), Proceedings of the VIIth John-Labatt Marketing Research Seminar, Time and Consumer Behavior, UQAM, Montreal, Canada.
Zakay, D. & Nitzan, D. & Glicksohn, J. (1983). The influence of task difficulty and external tempo on subjective time estimation. *Perception and Psychophysics*, *34*, 451-456.

Zakay, D. (1989). *Subjective time and attentional resource allocation: an integrated model of time estimation*. In: Zakay, D. (Eds) and Levin, I. (1989), Time and Human Cognition: A Life Span Perspective, Advances in Psychology, No. 59, Elsevier, Amsterdam. Pp. 365-397.

Zakay, D. (1993). Relative and absolute duration judgments under prospective and retrospective paradigms. *Perception & Psychophysics, 54*, 656-664.

Zakay, D. (2000). Gating or switching? Gating is a better model of prospective timing (a response to "switching or gating?" by Lejeune). *Behavioral Processes,50,* 1-7

Zakay, D., Lombranz, J. & Kaziniz, M. (1984). Extraversion-introversion and time perception. *Personal Individual Differentiation*. 5(2), 237-239.

Zaltman, G. & Coulter, R.H. (1995). Seeing the Voice of the Customer:Metaphor-Based *Advertising Research Journal of Advertsing Research, 35*(4), 35-51.

Zaltman, G. (2008). *Hoe consumenten denken. Wat klanten je niet kunnen vertellen en je concurrenten niet weten. Essentiële inzichten in de psychologie van de markt.* Business Contact. Amsterdam/Antwerpen.

Zeithaml, V. (1988). Consumer Perceptios of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence. *Journal of Marketing*, *52*(July), 2-22.

Zeithaml, V., Bitner, M.J., & Gremler, D.D. (2006). *Services marketing. Integrating customer focus across the firm* (4th edition). New York: McGraw-Hill Companies.

Zeithaml, V.A. & Bitner, M.J. (2003). *Services Marketing. Integrating customer focus across the firm.* Third edition. McGraw-Hill Higher Education, New York.

APPENDICES

APPENDIX 1

NS PANEL

The NS panel consists of people who have voluntarily stated that they wish to participate now and again in NS research. Anno 2010 the panel has 110,000 members who are approached for various studies 4-5 times per year. They receive no fixed remuneration for their participation but with each study a number of book tokens are raffled among respondents. Each panel member fills in a basic questionnaire so that the most important socio-demographic characteristics are known, albeit that their anonimity is guaranteed. Not only do the basic questionnaires allow us to create a representative composition of the passenger population, but respondents can also be approached for research without having to repeatedly fill in the same data. The response level is between 35% and 40%. Examples of basic characteristics are **travel data**: travel motive and travel frequency (example Figure 1), travel time and days of travel, use of access and egress transport, type of ticket, first/second class, etc. Examples of **background data**: gender, age, education, owner of driver's license, availability of car/motorbike, composition of household, age of children, current occupation, place of residence, etc.

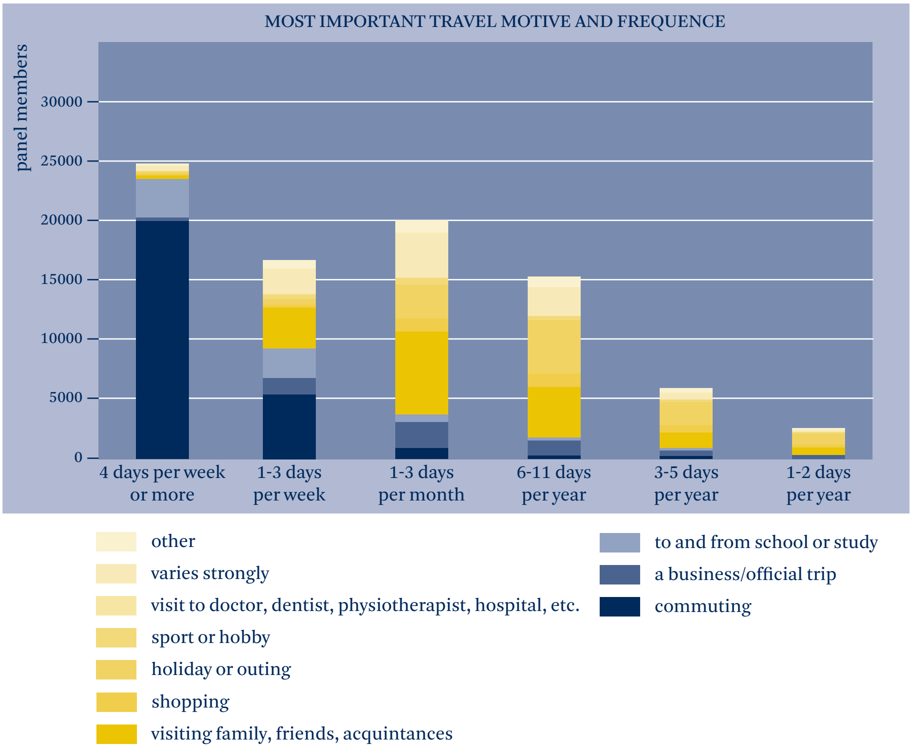


Figure 1 Travel motives and travel frequency of panel members

APPENDIX 2
TWO PRELIMINARY STUDIES FOR MUSICAL GENRE (CHAPTER 6)

INTRODUCTION

Lindstrom (2005) identified that music is a stimulus that can have the most direct emotional effect on people. As NS strives to offer its passengers a pleasant stay at both the station and on the platform, we investigated whether music can be deployed to raise their spirits and thus create a more positive waiting and station experience. Besides the tempo of the music also the genre influences the effect of music (Bruner, 1990; Oakes, 2000; 2003; Oakes & North, 2008). The basic premise of reversal theory (Paragraph 4.11) is that with stressed people calming music affords a *positive* hedonic tone, whereas with people who are bored it is stimulating music that affords a *higher* hedonic tone. In order to ascertain what music people appreciate and find suitable at a station, an online study was conducted among the NS panel to find out their musical preferences and the associations and emotions they, as passengers, had with stimulating and calming music. We also enquired after their musical preferences in different situations, e.g. when they were stressed or relaxed, and to what degree they, as passengers, would value music at a station. A subsequent study was carried out to test whether the stimulating and calming musical genres were indeed experienced as such in practice. In the online study in the virtual world the tested musical genres (calming and stimulating) were tested in various contexts (passenger type, density, Chapter 7).

PRELIMINARY STUDY 1.
ONLINE STUDY OF MUSICAL PREFERENCES AND ASSOCIATIONS

Of the 4,000 NS panel members (50% commuters and 50% non-commuters) to whom an online questionnaire was sent, 1,013 responded (26% response). It comprised questions on musical preference and respondents could hear and evaluate two musical genres, namely stimulating and calming. The tracks were selected by a music expert (Maarten Hartveldt, a renowned composer of film scores). The selection criteria for the tracks concerned the emotional tone (melodical complexity, rhythmic complexity, vocal meaningfulness and consonant harmony), whereas other criteria such as volume, tempo and pitch (Bruner, 1990) were kept as similar as possible in order to prevent *confounding effects* (Kellaris & Kent, 1994). The findings revealed that 96% of the respondents enjoy listening to music and that pop/easy listening was the most favourite genre (54%), followed by classical music (41%). The musical preference barely differed from the average when respondents were either happy or relaxed; only classical music was then chosen relatively seldom. In a stressful situation a large group of respondents (28%) preferred to hear no music at all, and the largest group (34%) opted for classical music. On enquiry, 70% of all people at stations like to hear music during off-peak hours, with easy listening being the favourite. Commuters claim to have the least need for music at the station, both during the day and in the evening. Students and holidaymakers have the greatest need for music, both during the day and in the evening. In the evening there is also a greater preference for classical music than during the day. After the respondents had evaluated several musical fragments online, it appeared that stimulating fragments were assessed as being more uplifting, busy and exciting than calming fragments. The latter were found to be more nostalgic and calming than their stimulating counterparts.

PRELIMINARY STUDY 2. LIVE INVESTIGATION EFFECTS MUSICAL GENRE AT LEIDEN CENTRAL

To ascertain whether the findings of the online study would also be found in an actual station environment, various tracks from these two musical genres were played at Leiden Central Station over a period of four days. The effect of the genres was measured by asking customers in the hall and on the platform a brief number of questions. A total of 129 passengers (47% female, 53% male; average age 36.8 ($SD = 17.3$)) were asked whether the music was *sleep-inducing/stimulating* and *calming/stress-enhancing* (10-point scale). It appeared that 42% of the passengers had noticed the music. No significant differences were found between passengers who said that they had/had not heard the music. An analysis of variance showed a significant main effect for the degree of stimulation: stimulating ($F(2, 69) = 3.10$, $p = .05$) and stress-enhancing ($F(2, 69) = 3.72$, $p = .03$). A post hoc analysis revealed that stimulating music was found to be more stimulating ($M = 6.8$, $SD = 1.7$) than calming music ($M = 5.1$, $SD = 2.0$), and that stimulating music was also found to be more stress-enhancing ($M = 5.3$, $SD = 2.2$) than calming music ($M = 3.3$, $SD = 1.8$). It also appeared that stimulating music ($M = 6.1$, $SD = 2.3$) afforded a better appreciation of the environment than calming music ($M = 5.5$, $SD = 1.8$, $F(2, 125) = 3.0$, $p = .05$). At the same time passengers appeared to become bored sooner with stimulating music ($M = 6.1$, $SD = 2.8$) than with relaxing music ($M = 2.8$, $SD = 2.9$, $F(2, 125) = 3.3$, $p = .04$). The connection might, however, be the other way round. People who are bored are more receptive to stimuli, hence a greater arousal with stimulating music and their actually noticing it (Pruyn & Smidts, 1998).

Finally, an ANOVA showed an interaction between passenger type and musical genre with regard to the degree of stimulation ($F(1, 34) = 4.01$, $p = .05$). Must passengers found stimulating music more stress-enhancing ($M = 5.55$, $SD = 2.12$) than relaxing music ($M = 2.5$, $SD = 1.0$, $F(1,34) = 15.33$, $p = .000$). No significant differences were found for lust passengers ($M = 4.33$, $SD = 2.51$; $M = 4.17$, $SD = 2.13$, $F < 1$). Figure 2 shows the interaction plot.

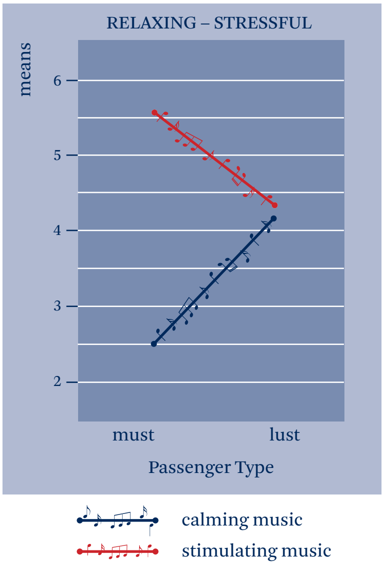


Figure 2 *Interaction passenger type and musical genre on degree of stimulation*

DISCUSSION

The findings confirm reversal theory, according to which must passengers are more in a *telic* (systematic/goal-directed) state; with extra arousal then soon being too much, must passengers experience more stress with stimulating music. As lust passengers find themselves in a *paratelic* (activity-directed/playful) state, they do not react strongly to extra stimuli and experience an optimum between stress-enhancing and relaxing with either stimulating or calming music. Must passengers seem to find the desired peace with calming music. On the basis of these results six tracks were selected per musical genre (Appendix 3) to serve as stimulus material for a further study in the virtual world (Chapter 7).

APPENDIX 3
MUSICAL GENRES ONLINE STUDY VIRTUAL STATION (STUDY 3)

Table 1. The tracks used in the online virtual music study (Chapter 7)

Muziekgenre	Performer & title	BPM	Subjective BPM
Stimulating	Marvin Gaye – Got to give you up	122	61
Stimulating	Earth, Wind & Fire – September	124	62
Stimulating	Miriam Makeba – Pata Pata	126	63
Stimulating	Paul Simon – Late in the evening	120	120
Stimulating	Jocelyn Brown – Always there	120	120
Stimulating	Oscar d'León – Que Muchacho	120	120
Calming	Michael Bublé – Quando, Quando, Quando	116	58
Calming	Madeleine Peyrouth – Blue alert	112	56
Calming	Michael Franks – Nightmoves	108	54
Calming	Van Morrison – Have I told you lately	71	71
Calming	Oleta Adams – Get here	55	55
Calming	Sheryl Crow – We do what we can	64	64
Control condition	Normal station background noises	–	–

In many studies, the tempo of music plays an important role in how both the emotion and the time is experienced (Kellaris & Kent, 1992; McElrea & Standing, 1992; Milliman, 1982; 1986; Oakes, 2003). How music is experienced does not solely depend on the tempo but also on the subjective impression thereof. The subjective tempo is the emotional interpretation of the exact BPM (beats per minute) to half of the assigned tempo. This can be regarded as the *subjective* BPM. The emotional interpretation is evident with dance, for example: with certain songs people dance twice as slow as the beat (BPM). People perceive and then interpret a half tempo. This interpretation occurs simultaneously among large groups of people and is not restricted to culture or place. In musical scores, the subjective tempo is visible by a two-two instead of a four-four time. In the same duration, two slow beats can be counted instead of four. Hence with music, as with time perception, one can speak of the objective tempo and the 'more subjective, emotionally interpreted tempo'[17]. The perceived BPM determines whether music is found to be relaxing or

17 Source: Several interviews with Maarten Hartveldt, a renowned composer of film scores.

stimulating. That is to say the BPM can designate the music as relaxing but it might not be perceived as such. The same applies to stimulating music, which might be designated as such by the number of BPM yet not perceived to be so. In the online study the explicit choice was made to include, besides tempo, also the subjective music tempo. The two musical genres were thus selected whereby not the BPM but the degree of stimulation (subjective tempo) defined the difference between the genres.

APPENDIX 4
PRELIMINARY STUDY RESPONSIVENESS MUST AND LUST PASSENGERS TO ENVIRONMENTAL STIMULI

INTRODUCTION

A separate study dealt with the question whether lust passengers are more receptive to environmental stimuli than must passengers. On a weekday (Thursday), 350 questionnaires were randomly distributed to passengers on various trains in the Netherlands, of which 239 could be used for analysis. Of the respondents 49% were male and 51% were female and their average age was 35.8 years (SD = 16.46). Of the 239 passengers 61% were identified as lust passengers and 39% as must passengers.

MEASURES

Lust and must passengers were identified according to their travel motive. *Must*: work, business/official trip, school/study; *lust*: visiting family/friends/acquaintances, shopping, holiday/outing, sport/hobby. *Arousal* was measured with six items (relaxed-stimulated, calm-excited, jittery-dull, wide awake-sleepy, sluggish-frenzied, unaroused-aroused). *Dominance* was measured with four items (influenced-influential, cared for-in control, guided-autonomous, submissive-dominant). *Hedonic orientation* was measured with three items by using items of the Shopping Values of Batra and Ahtola (1991). All measures on a 7-point Likert scale whereby 1 stood for 'completely disagree' and 7 'completely agree'

RESULTS

It appeared from several ANOVAs that, as expected, lust passengers are more receptive to environmental stimuli than must passengers. Lust passengers appear to be more hedonistically oriented (M = 3.71; SD =1.33) than must passengers (M = 3.20; SD = 1.27, $F(1, 236) = 8.69$, $p = .004$). Lust passengers experience less *arousal* (M = 2.25; SD = .65) than must passengers (M = 3.88; SD = 1.29, $F(2, 231) = 2.80$, $p = .008$) and must passengers experience greater dominance (M = 4.36; SD = .66) than lust passengers (M = 4.92; SD = 1.13, $F(2, 231) = 2.32$, $p = .001$). These results concur with the findings of Massara, Liu and Melara (2010). It can be concluded that lust passengers have a more hedonic orientation, are more receptive to environmental stimuli and feel less in control than must passengers.

APPENDIX 5

Table 2 *MANOVAs online studies time perception* (Wilks' Lambda)*

	MANOVA			
	F	*df*	*Error*	*p*
MANOVA Colour online	184.413	2	1302	.000
Time experience platform	32.13	1	1303	.000
Affective wait evaluation platform	12.17	1	1303	.001
MANOVA Music online	7.26	2	503	.001
Time experience platform	9.50	1	504	.002
Affective wait evaluation platform	11.48	1	504	.000
MANOVA Advertising online	51.31	2	477	.000
Time experience platform	45.61	1	478	.000
Affective wait evaluation platform	3.03	1	478	.082
MANOVA Infotainment online	40.36	2	862	.000
Time experience platform	79.90	1	863	.000
Affective wait evaluation platform	19.67	1	863	.000

** Objective time platform = co-variate*

SUMMARY

RESEARCH QUESTION

In the railway sector there is a great deal of interest in objective time but hardly any in passengers' subjective experience of time. The focus of this thesis is thus not on (shortening) objective time but on how time itself is experienced and how this can be improved. Aware that a journey must not only be quick but also pleasant, Netherlands Railways (NS) consequently sets itself the following objective: *"To transport our passengers safely, on time and in comfort via appealing stations."* Particularly the wait is found to be unpleasant, with passengers regarding stations and especially platforms as sombre, boring and grey places, devoid of atmosphere and colour. By improving the waiting environment, we can kill two birds with one stone: passengers will find waiting more pleasant and the waiting time will appear to be shorter. The practical question in this thesis thus reads: *"Which measures are effective to make the waiting time at stations more pleasant and/or to shorten the perception of waiting time?"*

TIME AND ENVIRONMENTAL EXPERIENCE

People do not possess a sense with which they can perceive time but they can perceive the waiting environment with the senses they *do* have. It is the quality of the environment, that together with the quality of staff and service, determines the total quality experience of the service. Whilst waiting on a platform, passengers have sufficient time to take in their surroundings. Environmental stimuli are cognitively and affectively processed and lead to approach or avoidance behaviour (*SOR model*). With avoidance behaviour, people wish to leave as soon as possible and with approach behaviour they prefer to stay longer and explore the area – as well as being prepared to purchase more. The waiting experience is also a cognitive and affective process, with the number and relevance of events in the waiting environment determining how time is experienced. The affective experience of time reflects how people emotionally experience a period of time, with pleasure, arousal and the degree of experienced control playing a key role. Conversely, the cognitive

experience of time concerns the estimation of time and how the duration thereof (short/long) is experienced; it is moreover influenced by the having to process little or much information (*storage size & segmentation model*) and by the having to divide one's attention between time- and non-time-bound activities (*attentional model*). When much attention is paid to the surroundings, time seems to pass more quickly, whereas when much attention is paid to the time, it seems to pass more slowly. A shorter time estimation affords a more positive appraisal of the service and greater approach behaviour.

ENVIRONMENTAL STIMULI

Environmental psychologists, such as Baker & Cameron (1996), divide the waiting environment into three components: *ambient elements* (intangible: light, temperature, sound and music), *design elements (*tangible/visible: colour, design and furniture) and *social elements (*people: customers and staff). O*ptimal arousal theory* poses that with an optimal number of stimuli, people experience greater pleasure than when there are too few or too many. With an optimal number, the stimuli are experienced as congruent, i.e. logical and in accordance with the expectation, fitting the consumer's goal or the degree of density/crowding at that specific moment. Congruent stimuli afford an optimal *processing fluency,* realized with the least mental energy. With his *reversal theory*, Apter (2007) distinguishes two levels of optimal arousal, a low and a high one, with the context determining which level is preferred. Hence people who are stressed are less receptive to extra stimuli, although they welcome them when they are bored.

SET-UP OF THE STUDIES

The field and laboratory studies in this thesis answer the question how the *ambient, design* and *social* dimensions must be implemented in order to create a positive station and waiting experience. With Apter's *reversal theory* occupying centre stage when testing the hypotheses, the waiting environment in each study was thus manipulated with two levels of stimulation: little versus many stimuli. Examples: cool/warm colours, little/much light, calming/stimulating music and static/moving (adverstising) images. The *ambient* dimension in the studies was manipulated with music and light intensity, the *design* dimension with colour, advertising and infotainment, and the *social* dimension by varying the degree of density on the platform. As reversal theory presupposes that in different situations identical environmental stimuli will lead to divergent reactions, we also explored the influence of environmental stimuli on two moderators: motivational orientation and platform density. It was expected that the presence of many other passengers sufficed as stimulation and that more stimuli would draw people out of their comfort zone. Conversely, we expected passengers on a deserted platform to experience so few stimuli that extra ones would actually draw them into their comfort zone. For motivational orientation we used two types of customer, namely must and lust passengers. Must passengers are utilitarian re orientation, are more in a hurry, concentrated on the travel process and less receptive to distraction in their surroundings. Our assumption was, therefore, that must passengers want a well-organized/surveyable environment that is not too stimulating and that they would not appreciate the addition of extra stimuli. Lust passengers, on the other hand, are more hedonistic; they are in less of a hurry and less occupied with the travel process. We expected lust passengers to be more receptive to distraction and to welcome extra environmental stimuli.

RESULTS TIME EXPERIENCE

In our studies we saw that passengers spend two-thirds of their time at the station actually waiting on the platform. Passengers not only find waiting tedious but they also systematically overestimate the duration of the wait. Although those with a short wait overestimate its length more than those whose wait is long, they still awarded the platform a higher score as well as experiencing greater pleasure and finding the wait more useful and enjoyable. Further analysis showed that it is not the estimation of the time but the appraisal of the wait (short/long, pleasant/boring) that determines how satisfied passengers are with the service. Attention to the time and the processing of environmental stimuli moreover determine how passengers experience the time. Passengers who do not heed the time feel pleasant and relaxed and time thus seems to pass more quickly. Conversely, passengers who do heed the time feel bored or stressed and time seems to pass more slowly. Furthermore it appeared that (un)conscious attention to one's surroundings also has an influence on how time is experienced. Subtle environmental stimuli, such as colour and light intensity, are barely consciously perceived, whereas in a stimulating environment (with warm colours, much light), passengers do have more stimuli to process which, in accordance with the *storage size/segmentation model*, seems to make time go slower. Consciously perceived stimuli, such as music, advertising and infotainment, afford distraction from the time which means that there is less *processing capacity* to keep an eye on the time, which – in accordance with the *attentional model* – then seems to pass more quickly.

RESULTS ENVIRONMENTAL EXPERIENCE

Particularly when it is quiet, passengers experience the platform as boring and barely stimulating. By adding environmental stimuli in the shape of music, advertising, infotainment and coloured light, passengers find the wait more enjoyable, useful and pleasant. The degree of stimulation appears to be crucial to the experienced pleasure, degree of control and the wait, with the stimuli influencing

the *processing fluency* and needing to be congruent with the customer's objective. As expected, the findings demonstrated that the most positive evaluation is created when the number of stimuli is in sync with the passenger's goal-orientedness and the density on the platform. The most positive effects occurred by either adding many stimuli to a quiet platform or few stimuli to a busy one. Conversely, too many stimuli on a busy platform has a negative effect on the station and waiting experience, as do too few on a busy platform. Also apparent was that lust passengers are more receptive to extra environmental stimuli than must passengers. On a quiet platform they feel better with stimulating or fast music, dimmed lighting, warm colours and they seek distraction by screens narrowcasting (rail-related) informative programmes. In contrast, must passengers sooner covet having a sense of control on their stay, i.e. being able to orientate themselves better, feeling certain and able to keep abreast of the time, as well as being as minimally distracted as possible by environmental stimuli. Must passengers thus lean strongly towards cool colours, a lower level of lighting, no or only relaxing/slow music and serious content on the screens, such as news and topical affairs. For light, colour and music it thus applies that incongruent environmental stimuli afford a more positive station experience. This is in keeping with *reversal theory*'s 'mildly incongurent' environmental stimuli. The findings of the advertising and infotainment study, whereby the most positive appraisal occurs with a fast screen change in a busy environment, on the other hand, are not in keeping with *reversal theory*. One explanation for this might be that – irrespective of the task – the human mechanism aspires after a congruent visual input (with an optimal *processing fluency*), so that as little energy as possible need be invested in visually perceiving the environment. With much visual input, other senses, such as hearing, can become overstimulated, resulting in stress. In this way, music is welcomed in a visually understimulating environment and the passenger is aroused enough to be drawn into his/her comfort zone. However, in a visually stimulating (busy) environment that same music affords too much arousal, which can lead to mental overload and a more negative station evaluation.
One remarkable finding of these studies is that the passengers' opinion is at odds with their emotional experience. On enquiry, passengers claim not to need advertising or music at a station, yet the results of the experimental studies demonstrate that those same passengers feel better with both. Passengers also find that the station should be brightly lit, yet here, too, the findings show that dimmed lighting affords a more positive station and waiting experience. Apparently, passengers have a conscious, predominantly cognitive image of a station that is at variance with their unconscious, affective perception. With the Delphi study of the role of waiting experience for Dutch service providers (Chapter 2) having revealed that managers and experts are convinced of the importance to their customers of a sense of control and a pleasant waiting environment, the findings of the studies in this thesis demonstrate just how vital the intensity of environmental stimuli is when pursuing and realizing this.

RECOMMENDATIONS

It goes without saying, that negative stimuli should first be eliminated or neutralized before adding positive ones. As regards visual impressions, negative visual stimuli, such as graffiti, dirt or an unattractive view, should be prevented as much as possible. To improve the appeal of the platform, the negatively perceived colour grey on the platform could be punctuated by adding colour or coloured light. As regards sound, undesirable ambient noise should be avoided, such as the din made by machines, traffic or other sources of sound and, instead, the wait should be 'softened' with fitting music (or calming nature sounds). By differentiating between consciously and unconsciously perceived environmental elements, people's attention can be steered in a desired direction. We have seen that colour and light intensity are often perceived unconsciously, just as music and infotainment are more noticeable. This implies that colour and light intensity can be deployed to positively influence the atmosphere, just as music and infotainment can be implemented to distract people from their wait. We recommend the development of a dynamic programme of stimuli, adapted to the density and function of the area in which the passengers find themselves. This means few stimuli in transfer areas and many in stay areas. By adding warm colours and stimulating music to waiting areas and shops, passengers will experience greater pleasure. In transfer areas, such as pedestrian routes, cool colours and silence afford a more pleasant experience. The conclusion is that by adding the right environmental stimuli at the right moment, both the station and the wait are more positively evaluated, resulting in the score for the general appraisal of the platform increasing by half to one full point.

SAMENVATTING

ONDERZOEKSVRAAG

In de spoorsector bestaat veel aandacht voor de objectieve tijd, maar nauwelijks voor de subjectieve tijdbeleving van reizigers. De focus in dit proefschrift ligt daarom niet op de objectieve tijd en het verkorten daarvan, maar op de beleving van de tijd en het veraangenamen daarvan. NS beseft dat een reis niet alleen snel, maar ook aangenaam moet zijn, verwoord in de missie: *"Meer reizigers veilig, op tijd en comfortabel vervoeren via aantrekkelijke stations"*. Vooral wachten op stations wordt door reizigers als onaangenaam ervaren. Reizigers vinden stations en vooral perrons doorgaans somber, saai, grauw, sfeer- en kleurloos en ze vinden het niet prettig om er te wachten. Door de wachtomgeving te veraangenamen kunnen twee vliegen in één klap worden geslagen: reizigers vinden het plezieriger om te wachten en de wachttijd lijkt minder lang te duren. De praktische vraag van dit proefschrift is dan ook*: Welke maatregelen zijn effectief om de wachttijd op stations te veraangenamen en/of de wachttijdperceptie te verkorten?*

TIJD EN OMGEVINGSBELEVING

Mensen bezitten geen zintuig om de tijd waar te nemen, maar kunnen met de beschikbare zintuigen wel de wachtomgeving waarnemen. De kwaliteit van de omgeving bepaalt (samen met de kwaliteit van het personeel en de dienst) de kwaliteitsbeleving van de dienstverlening. Wanneer reizigers op een perron wachten hebben ze voldoende tijd om de omgeving in zich op te nemen. Prikkels uit de omgeving worden cognitief en affectief verwerkt en leiden tot toenaderings- of vermijdingsgedrag (*SOR model*). Bij vermijdingsgedrag willen mensen de omgeving zo snel mogelijk verlaten en bij toenaderingsgedrag willen mensen langer in de omgeving blijven, de omgeving gaan verkennen en zijn ze bereid om meer aankopen te doen. De beleving van de wachttijd is eveneens een cognitief en affectief proces, waarbij het aantal en de relevantie van de gebeurtenissen in de wachtomgeving bepalen hoe de tijd ervaren wordt. De affectieve tijdbeleving geeft weer hoe mensen een tijdsinterval emotioneel hebben beleefd waarin pleasure, arousal en de hoeveelheid ervaren controle een centrale rol vervullen. De cognitieve tijdbeleving betreft de schatting van de tijd en de tijdsduurervaring (kort of lang) en wordt beïnvloed door verwerking van veel of weinig informatie (*storage size & segmentation model*), alsmede de verdeling van aandacht tussen tijd en niet-tijdgebonden activiteiten (*attentional model*). Wanneer veel aandacht naar de omgeving gaat dan lijkt de tijd sneller te gaan, wanneer veel aandacht naar de tijd gaat, dan lijkt de tijd langzamer te gaan. Een kortere tijdschatting leidt tot een positievere evaluatie van de dienstverlening en tot meer approachgedrag.

OMGEVINGSPRIKKELS

Omgevingspsychologen (bijv. Baker & Cameron, 1996) verdelen de wachtomgeving in drie componenten: *Ambient elements* (ontastbaar: licht, temperatuur, geluid en muziek), *design elements (*tastbaar/zichtbaar: kleur, inrichting en meubilair) en *social elements (*mensen: klanten en personeel). De *optimal arousal theorie* stelt dat mensen bij een optimaal aantal prikkels meer plezier ervaren dan bij te weinig of teveel prikkels. Bij een optimaal aantal prikkels worden de prikkels als congruent ervaren, dat wil zeggen logisch en in overeenstemming met de verwachting, passende bij het doel van de consument of de mate van drukte op dat moment. Congruente prikkels zorgen ervoor dat een optimale *processing fluency* wordt bereikt, welke de minste mentale energie kost. Apter (2007) onderscheidt met zijn *reversal theorie* twee niveaus van optimal arousal, een laag en een hoog niveau, waarbij de context bepaalt welk niveau geprefereerd wordt. Zo staan mensen die gestrest zijn minder open voor extra prikkels, maar worden extra prikkels verwelkomd, wanneer mensen zich vervelen.

OPZET STUDIES

De veld- en laboratoriumstudies in dit proefschrift geven antwoord op de vraag hoe de *ambient, design* en *social* dimensies ingericht moeten worden om een positieve stations- en wachttijdbeleving te creëren. De *reversal theorie* van Apter (2007) staat centraal bij het toetsten van de hypothesen. Daarom is de wachtomgeving in alle studies steeds met twee niveaus van prikkeling gemanipuleerd: weinig stimuli versus veel stimuli. Voorbeelden zijn koele/warme kleuren, weinig/veel licht, rustige/stimulerende muziek of stilstaande/bewegende (reclame)beelden. De *ambiente* dimensie is in de studies gemanipuleerd met muziek en lichtsterkte, de *design* dimensie met kleur, reclame en infotainment en de *social* dimensie door de mate van drukte op het perron te variëren. De reversal theorie veronderstelt dat dezelfde omgevingsprikkels in verschillende situaties tot andere reacties zullen leiden. Daarom is tevens onderzocht wat de invloed van omgevingsprikkels is op twee moderatoren, motivationele oriëntatie en drukte op het perron. Verwacht wordt dat veel andere reizigers voor voldoende prikkels zorgen en extra omgevingsprikkels mensen buiten de comfortzone brengt. Aan de andere kant verwachten we dat reizigers op een verlaten perron zo weinig prikkels ervaren dat juist extra prikkels hen in de comfortzone brengt. Voor de motivationele oriëntatie is uitgegaan van twee reizigerstypen, must- en lustreizigers. Mustreizigers zijn utilitair georiënteerd, hebben meer haast, zijn geconcentreerd bezig met het reisproces en hebben minder oog voor afleiding uit de omgeving. We veronderstellen dat mustreizigers een overzichtelijke omgeving wensen die niet te prikkelend is en verwacht wordt dat toevoeging van extra prikkels door mustreizigers niet zal worden gewaardeerd. Lustreizigers hebben daarentegen een hedonistische oriëntatie, zijn minder gehaast en minder bezig met het reisproces. We veronderstellen dat lustreizigers meer open staan voor afleiding en extra omgevingsprikkels door hen worden verwelkomd.

RESULTATEN TIJDBELEVING

In de studies hebben we gezien dat reizigers tweederde van hun stationstijd wachtend op het perron doorbrengen. Reizigers vinden wachten vervelend en overschatten de wachttijd stelselmatig. Hoewel reizigers die kort wachten de wachttijd meer overschatten dan reizigers die lang wachten, geven ze het perron toch een hoger rapportcijfer, ervaren ze meer pleasure en vinden ze het wachten nuttiger en aangenamer. Nadere analyses leren dat niet de schatting van de tijd, maar de waardering van de wachttijd (kort/lang, aangenaam/vervelend) bepaalt in hoeverre reizigers tevreden zijn met de dienst. De aandacht voor de tijd en de verwerking van omgevingsprikkels bepaalt daarbij hoe reizigers de tijd ervaren. Reizigers die niet op de tijd letten voelen zich plezierig en ontspannen, waardoor de tijd sneller lijkt te gaan. Reizigers die wel op de tijd letten voelen zich verveeld of gestrest, waardoor de wachttijd langzamer lijkt te gaan. Verder blijkt dat de (on)bewuste aandacht voor de omgeving ook invloed heeft op de tijdbeleving. Subtiele omgevingsprikkels als kleur en lichtsterkte worden nauwelijks bewust waargenomen, maar in een prikkelende omgeving (warme kleuren, veel licht) moeten reizigers wel meer prikkels verwerken, waardoor de tijd conform het *storage size/segmentation model* langzamer lijkt te gaan. Prikkels die bewuster worden waargenomen, zoals muziek, reclame en infotainment zorgen ervoor, dat de aandacht afgeleid wordt van de tijd, waardoor minder *processing capacity* over blijft om de tijd te volgen en deze sneller lijkt te gaan, conform het *attentional model.*

RESULTATEN OMGEVINGSBELEVING

Reizigers ervaren het perron vooral op rustige momenten als saai en weinig prikkelend. Door het toevoegen van omgevingsprikkels in de vorm van muziek, reclame, infotainment en gekleurd licht ervaren reizigers het wachten als plezieriger, nuttiger en aangenamer. De mate van prikkeling blijkt cruciaal te zijn voor de ervaren pleasure, de hoeveelheid ervaren controle en de wachttijdbeleving, waarbij de prik-

kels de *processing fluency* beïnvloeden en congruent moeten zijn met het doel van de klant. Zoals verwacht laten de resultaten zien dat de meest positieve evaluatie wordt gecreëerd, wanneer het aantal prikkels aansluit bij de doelgerichtheid van reiziger en de drukte op het perron. De meest positieve effecten ontstaan door toevoeging van veel prikkels op een rustig perron en toevoeging van weinig prikkels op een druk perron. Omgekeerd hebben teveel stimuli op een druk perron een negatief effect op de stations- en wachttijdbeleving, evenals te weinig stimuli op een rustig perron. Ook blijken lustreizigers meer open te staan voor extra omgevingsprikkels dan mustreizigers. Zo voelen lustreizigers zich op een rustig perron prettiger met stimulerende of snelle muziek, gedimde verlichting, warme kleuren en willen ze op beeldschermen afleiding zien, zoals (railgerelateerde) informatieve programma's. Mustreizigers ervaren juist meer plezier als ze een gevoel van controle hebben over hun verblijf, dat wil zeggen dat zij zich goed kunnen oriënteren, zich zeker voelen en grip op de tijd kunnen houden, maar ook dat ze zo min mogelijk worden afgeleid door omgevingsprikkels. Mustreizigers hebben daarom vooral behoefte aan koele kleuren, een laag verlichtingsniveau, geen/ontspannen of langzame muziek en willen serieuze inhoud op beeldschermen zien, zoals nieuws en actualiteiten.
Voor licht, kleur en muziek geldt dus dat incongruente omgevingsprikkels tot een positievere stationsbeleving leiden. Dit sluit aan bij de *reversal theorie* welke uitgaat van *mildly-incongruente* omgevingsprikkels. De resultaten van de reclame- en infotainmentstudie, waarbij de meest positieve waardering ontstaat bij snelle wisselingen van beelden in een drukke omgeving stroken niet met de *reversal theory.* Een verklaring zou kunnen zijn dat het menselijk mechanisme ongeacht de taak streeft naar congruente visuele input, met een optimale *processing fluency,* zodat zo min mogelijk energie gestoken hoeft te worden in het visueel waarnemen van de omgeving. Prikkels van andere zintuigen, zoals gehoor, kunnen bij veel visuele input overprikkelen, waardoor stress ontstaat. Zo wordt muziek in een visueel weinig prikkelende omgeving verwelkomd en ontvangt de reiziger voldoende prikkels om in de comfortzone te komen. Echter, bij een visueel prikkelende (drukke) omgeving zorgt dezelfde muziek voor teveel arousal wat kan leiden tot een mentale overbelasting en een negatievere stationsevaluatie.
Opvallend resultaat uit de studies is dat de mening van reizigers afwijkt van hun emotionele ervaring. Zo geven reizigers desgevraagd aan, dat ze geen behoefte hebben aan reclame of muziek op een station, maar de resultaten uit de experimentele studies tonen aan dat dezelfde reizigers zich plezieriger voelen met muziek en met reclame. Ook vinden reizigers dat het station helder verlicht moet zijn, maar ook hier laten de resultaten zien dat gedimde verlichting leidt tot een positievere stations- en wachttijdbeleving. Blijkbaar hebben reizigers een bewust, voornamelijk cognitief geïnspireerd beeld van een station dat afwijkt van de onbewuste, affectieve beleving. Uit de Delphi studie naar de rol van wachttijdbeleving bij Nederlandse dienstverleners (hoofdstuk 2) bleek dat managers en deskundigen doordrongen zijn van het belang van het gevoel van controle en een aangename wachtomgeving voor

haar klanten. De resultaten van de studies in dit proefschrift tonen aan dat de intensiteit van de omgevingsstimuli de centrale schakel is om een gevoel van controle en plezier te realiseren.

AANBEVELINGEN

Het ligt voor de hand om eerst negatieve prikkels uit de omgeving te elimineren of te neutraliseren om daarna positieve prikkels toe te voegen. Ten aanzien van visuele indrukken moeten negatieve visuele stimuli, zoals graffiti, vuil of een onaantrekkelijk uitzicht zoveel mogelijk voorkomen worden. Om het perron te veraangenamen kan de als negatief ervaren kleur grijs op het perron op bepaalde plekken worden doorbroken door toevoeging van kleur of gekleurd licht. Voor geluid geldt dat ongewenst omgevingsgeluid vermeden moet worden, zoals herrie van lawaaiige machines, verkeer, of andere geluidbronnen, waarna met het inzetten van passende muziek (of rustgevende natuurgeluiden) het wachten veraangenaamd kan worden. Door een onderscheid te maken in bewust en minder bewust waargenomen omgevingselementen kan de aandacht van mensen in een gewenste richting gestuurd worden. We hebben gezien dat kleur en lichtintensiteit onbewust worden waargenomen en muziek en infotainment meer opvallen. Dit betekent dat kleur en lichtsterkte ingezet kunnen worden om de sfeer van de verblijfsruimte positief te beïnvloeden en muziek en infotainment kunnen worden ingezet om mensen afleiding te bieden van het wachten. Aanbevolen wordt om een dynamische programmering van prikkels te ontwikkelen aangepast aan de drukte en de functie van de ruimten waarin de reizigers zich bevinden. Dit betekent weinig prikkels in transfergebieden en veel prikkels in verblijfsgebieden. In wachtruimten en winkels kunnen bijvoorbeeld warme kleuren en stimulerende muziek worden toegevoegd aan de omgeving, reizigers ervaren dan meer plezier, maar in transferruimten, zoals de looproutes, zijn stilte en koele kleuren effectiever voor een prettige beleving. Geconcludeerd kan worden dat door het toevoegen van de juiste omgevingsprikkels op het juiste moment het station en de wachttijd positiever worden beoordeeld en het algemeen oordeel van het perron uitgedrukt in een rapportcijfer met een half tot een vol punt kan stijgen.

DANKWOORD

U heeft zojuist de kans gehad om in dit proefschrift kennis te nemen van wetenswaardigheden opgedaan in de ontdekkingsreis naar wachttijdbeleving. Dit proefschrift is daarmee een reisverslag, waarin alleen de inhoudelijke weergave van de onderweg verzamelde kennis is weergegeven. Het reisproces zelf komt nauwelijks aan bod. Toch is een reis niet alleen een functionele en doelgerichte operatie, maar kan een reis ook een gedenkwaardige belevenis zijn: de reis is de herberg. Met dit in het achterhoofd had ik me voorgenomen om niet alleen het doel van de reis voor ogen te houden, maar ook van het reizen zelf te genieten. Dat is gelukt! Maar uiteraard niet zonder een goede voorbereiding en zonder hulp van veel betrokken medereizigers. Ik hecht er grote waarde aan om de belangrijkste metgezellen te bedanken voor hun inspiratie, adviezen, hulp, maar vooral het plezier dat ze mij onderweg hebben gegeven. Daarbij ontstaat altijd het gevaar dat ik personen die een bijzondere rol hebben gespeeld vergeet te bedanken, bij deze wil ik de ook niet met naam genoemde relevante personen hier bedanken.

Als eerste wil ik de reisverkenner, Jan Jurriëns bedanken. Jan je hebt me vanaf 1996 regelmatig de suggestie gedaan, maar eens te gaan promoveren. Ik heb me daar lang tegen kunnen verzetten, met als belangrijkste reden tijdgebrek… Pas nadat je Aad Veenman informeerde over dit idee en in diezelfde week Ad Pruyn hét onderwerp voor onderzoek aanreikte en bereid was dat te begeleiden, wist ik dat alle bezwaren niet meer zouden opwegen tegen het avontuur. Aad, bedankt voor de aanmoediging en steun aan het begin van het traject, maar ook aan het eind door zitting te nemen in de promotiecommissie. Jan, bedankt voor de inspirerende voortgangsgesprekken, toen het spel eenmaal op de wagen was.
Elke ontdekkingsreis begint met een goede voorbereiding. Zoals in de eerste zin van mijn proefschrift staat kost een reis geld, tijd en moeite, zo ook deze reis. Door de financiële steun van NS en Prorail is het mogelijk geweest de verschillende onderzoeken uit te voeren en het boekje mooi vorm te geven. Daarvoor ben ik in het bijzonder dank verschuldigd aan Paul Rooijmans, Paul Schulten, Jan-Paul van Heemskerck, Erik Beenen, Roger Courtens, Jaap Reinders, Peter Krumm en Mark Bendik. Verder heeft NS mij een dag in de week de tijd gegund om aan mijn

avontuur te wijden, zodat ik meer tijd had om mijn gedachten te verzetten van regulier werk naar promotieactiviteiten. Daarvoor wil ik graag Maarten Spaargaren, Maurice Unck, Theo van der Star en Jeroen Gemke bedanken. Jeroen je hebt mij in de laatste fase van het proefschrift veel ruimte gegeven om het verhaal goed af te kunnen ronden, omdat je van zeer nabij weet wat dit betekent, hartelijk dank daarvoor.
Verder hebben getalenteerde studenten van de Universiteit Twente mij veel werk uit handen genomen en daarmee tijd en moeite bespaard. Ik wil in het bijzonder die studenten bedanken die voor hun afstuderen invulling wilden geven aan enkele studies van mijn proefschrift en daarmee de noodzakelijke puzzelstukjes hebben aangereikt: Pam Roelofs (voorstudie motivationele oriëntatie); Joyce Peters (Virtueel laboratorium en online studie kleur & licht); Jessica Sauren (veldstudie kleur & licht en online studie muziek); Elsbeth Boes (veldstudies muziek); Judith Kramer (online reclame en infotainment studies); Koen van 't Hof (wachttijdbeleving en veiligheid, jammer Koen dat er in het boekje geen ruimte meer was voor de interessante studieresultaten, maar we werken aan een publicatie!). Al deze studenten zijn bij hun afstuderen begeleid door docenten van de vakgroep Marketingcommunicatie en Consumentenpsychologie.

In het begin van de reis heb ik veel geleerd van de praktijkkennis van een aantal deskundigen op het gebied van wachttijd(beleving) werkzaam bij verschillende dienstverleners. Dank gaat uit naar Hans Bartelds, Marieke den Boer, Kees-Jan Dosker, Ruud Huitenga, Jolanda van Halteren, Peter Krumm, Hans Martens, Edwin Okel, Paul Rooijmans, Gideon Ruig, Paul van Vlijmen, Roy de Vries, Olaf Vugts, Irma Winkenius, Ronald van der Zijl en Rob Zwerink.

Experimenteel onderzoek doen zonder respondenten is onmogelijk, daarom wil ik alle reizigers en NS panelleden die meegewerkt hebben aan de onderzoeken heel erg bedanken voor hun deelname. Ook hebben allerlei mensen noodzakelijke hand- en spandiensten verricht bij de uitvoering van de studies. Mijn naaste collega's op het werk – Baudien van 't Blik, Ineke van Uden, Monique Schalkwijk en Helga Bosma – wil ik bedanken voor allerlei regelwerk en het inplannen van de nodige afspraken, maar ook mijn collega's van MOA/BPO wil ik bedanken, in het bijzonder Bert de Vries voor zijn adviezen bij SPSS, Adriaan Roeleveld voor de betrokken gesprekken en kamergenoot Maarten Exel voor de gezelligheid en het aanreiken van NS data. Voor de ondersteuning bij de verschillende veldstudies wil ik diverse mensen in willekeurige volgorde bedanken: Eymert van Manen, Willem Boiten, Toine Schoutens, Michael Sebregts, Jurgen Bal, Peter het Hart, Peter de Jong, Niko Bakker, Dimphy Geldhof, Robert Jansen, Clara Lieverse en Wim Verheul. Voor het ontwikkelen van het virtuele station Leiden en de nodige aanpassingen daarin wil ik Jan Beumer en Pim Greijn van Movares bedanken. Ook Mark Veth, Willem de Jonge en de rest van het team van Cebra wil ik bedanken voor het online zetten van de virtuele wereld en het ontwikkelen van nieuwe toepassingen, zoals “streaming” van muziek en films in de virtuele wereld. Dankzij jullie inzet en aanstekelijke enthousiasme lukte het steeds om veranderingen op tijd online te hebben voor het onderzoek, ook al moesten we daarvoor wel eens doorwerken tot het allemaal goed werkte, zoals tot laat in de nacht op die kerstavond in 2008, waarin de trein maar niet op tijd wilde komen (ja beste lezer, ook in de virtuele wereld kan een trein te laat komen…). Ook Koos en Arjan Termorshuizen van Arachnea wil ik bedanken voor het zorg dragen van de programmering van de online vragenlijsten, het benaderen van de respondenten en het aanleveren van de databestanden.

Twee reizigers die mij bijzonder hebben geïnspireerd en nu ook bij de aankomst naast mij staan in de vorm van paranimfen, moet ik speciaal bedanken, Paul Rooijmans en Maarten Hartveldt. Paul, jij was vanaf het begin direct zo enthousiast en kreeg zoveel energie van mijn plannen, dat je dit project direct financieel wilde steunen, vanuit het programma Fens KVS, mits ik andere sponsors zou weten te betrekken. Dat is gelukt, hartelijk dank voor het vertrouwen, je hulp en de bijpraat-lunches. Maarten vanaf het eerste moment dat we elkaar spraken was er de bekende klik en hebben we vaak gediscussieerd over de rol en het effect van beleving, zeker op het terrein van muziek waar ik ongelofelijk veel van je geleerd heb. Hartelijk dank daarvoor.

Zonder een goede gids is een dergelijke reis een hachelijke zaak. Ad Pruyn heeft deze rol uitstekend vervuld. Ad je hebt mij als promotor duidelijk de weg gewezen, zonder mij de kans te ontnemen zinloze, doch interessante zijpaden te verkennen. Je 24/7 bereikbaarheid voor hulp en reflectie en constructieve en structurerende feedback waardeer ik zeer, waardoor het proefschrift een logisch en leesbaar verhaal is geworden. Mijn tweede gids, Mirjam Galetzka, wil ik hartelijk danken voor alle tijd en energie die ze gestoken heeft in het wegwijs maken in de academische mores, het coördineren van de studentenprojecten en het statistisch programma SPSS. Mirjam ik denk met veel plezier terug aan de sessies in Nijmegen en Deventer, waar ik erg veel van je leerde en we belangrijke knopen doorhakten. Ook mijn begeleider binnen NS, Bert Meerstadt, ben ik veel dank verschuldigd voor het houden van de aansluiting tussen academische wereld en het bedrijfsleven. Bert erg bedankt voor het lezen van alle tussenresultaten, je waardevolle suggesties, je hulp wanneer ik vast dreigde te lopen en de prettige doch intensieve gesprekken, waaruit steeds weer bleek dat in een half uur heel veel besproken kan worden. Ook Diane Ricketts is als vertaler een waardevolle gids geweest, die voor mij al de Nederlandse teksten naar keurig Brits Engels heeft omgezet. Diane ik wil je daarnaast bedanken voor je betrokkenheid, die zich tot op het laatste moment uitte in het minutieus doorlezen van de tussenstukken en het aanreiken van werkbare suggesties, waardoor de kwaliteit en leesbaarheid van het hele verhaal sterk is verbeterd.

Het is duidelijk dat gedurende de reis steeds nieuwe mensen instappen en anderen weer uitstappen. Ook in de laatste fase van de reis stappen weer nieuwe mensen in die een belangrijke rol spelen bij het bereiken van de bestemming, zoals de leden van de promotiecommissie. Ik wil jullie hartelijk danken voor de tijdsinvestering en het voorbereiden van de vragen tijdens mijn verdediging, waardoor het eindpunt van de reis duidelijk en feestelijk gemarkeerd is.

De broodnodige onthaasting en relativering heb ik steeds kunnen putten uit afleidende activiteiten, zoals de vakanties met het gezin, carnaval en uitstapjes met collega's, de jaarclub, de borrelclub en de buurtvereniging. In het bijzonder wil ik nog noemen André Emmers, Kees Nederveen en René Leijten, die steeds tijd wisten te maken voor een ontspannen 'gesprek'.

Daarnaast wil ik mijn ouders bedanken voor al de goede zorgen in mijn jeugd, waardoor ik de kans heb gehad mij in alle vrijheid te ontwikkelen naar de persoon die ik nu ben en daarmee het fundament hebben gelegd om deze reis aan te kunnen.

Last but not least wil ik Iris, Pieter en Hetty hartelijk bedanken voor al hun geduld en begrip. Ik vind het geweldig hoeveel respect jullie ervoor hadden dat jullie papa en man weinig tijd had en 'altijd boven zat'. Iris jou wil ik natuurlijk heel erg bedanken voor het ontwerpen van de mooie kaft van dit boek en Pieter voor onze zolder gesprekjes en het diepzinnige doorvragen wat me steeds weer aan het denken zette. En natuurlijk wil ik jou, Hetty, bedanken voor de tijd en vrijheid die je me de afgelopen jaren hebt gegeven om me volledig te kunnen concentreren op mijn werk en promotie activiteiten. Je hebt ons huishouden al die tijd volledig gerund en jezelf daarmee een aantal jaren weggecijferd. Ik kan niet in woorden uitdrukken hoeveel bewondering ik voor je heb. Zonder jou was dit proefschrift er nooit gekomen!

Zoals het hoort bij een goed verhaal, komt ook aan deze reis een eind. Ik koester warme herinneringen aan deze periode, waarbij het proefschrift als tastbaar aandenken overblijft en naar ik hoop anderen inspireert om ook een dergelijk avontuur aan te gaan. Van mijn promotor mag dat trouwens in aanzienlijk minder pagina's ...