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Content in the train: Taking a closer look at in-train screens

A study on what types of content, on in-train digital signage, lead to a more positive customer experience

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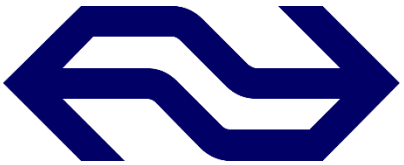

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Abstract

Purpose For NS, a big player on the public transportation market in the Netherlands, it is increasingly important to focus on an excellent experience. One way to influence the travel experience is to change the content on the in-train screens. These screens, better known as digital signage, can be used for information, advertising and entertainment. The main goal of the in-train screens is to provide travel information, but now the question has risen what other types of content could be shown on the screens. Because literature cannot provide enough insight research is needed.

Method The main study was an experimental design, which tested the effects of different types of content on in-train screens on the emotional experience of train passengers. It was a 2 (advertising vs no advertising) x 2 (information bar vs no information bar) x 2 (congruent content vs non-congruent content) between subjects design. In this context congruence meant relevant to NS or the travel by train. 835 respondents filled out the online questionnaire, in which they were shown one of the eight different movies.

Results Advertising showed main effects on almost all constructs, with the respondents not subjected to advertising always being more positive than the respondents who were exposed to advertising. The attitudes towards the specific commercials showed that the congruent commercials were more positively evaluated. The long commercials were more positively assessed than the short commercials. The long congruent commercial was evaluated most positively and better recalled and recognized than the other commercials. The information bar had a negative effect on emotions, but a positive influence on the review of travel information frequency.

Conclusion It was shown that advertising on the in-train screens had a negative influence on travellers. It would be better not to show advertising on the screens at all. When advertising has to be added it should be congruent to the travel and NS and it should only be calm and attractive commercials. More ambiguous results were found for the information bar. Looking at the great desire of respondents to see travel information and the main goal of the screens, it would be wise to add an information bar.

Preface

Here it is, the thesis with which I complete my master Communication Studies. I am very content with the final result. Performing such a large study provided me with a lot of insight in what aspects I like about doing research. I really enjoyed designing the research method and materials. Surprisingly I also liked analysing the data in SPSS, so curious about the results that it didn't even feel like work. Of course there also were parts of the research process that I enjoyed less. Writing a good literature review and creating a short and clear thesis were quite the challenge. But in the end I am very glad that I finished this project, even though it took a bit longer than I had planned.

With the end of this project also my time as a student at the University of Twente has come to an end. I already left Enschede and moved to The Hague, but I still sometimes miss the familiar little town. I've had some really great times at the UT, starting with my bachelor when I was just 17 years old. And although I might not have finished my study in the fasted way, I have learned a lot, had a lot of great experiences and made a lot of very good friends. I will definitely miss a lot of aspects of being a student, from participating in committees to going to lectures. I not only performed my master thesis with Mirjam Galetzka as my supervisor. She also supervised me during my bachelor thesis and was the coordinator of my master track. For the guidance during this project I really want to thank her a lot. Even when I felt down at the beginning of a meeting, I always walked out with renewed energy. Her positivity and enthusiasm work infective and I really enjoyed all our talks. I also want to thank my co-reader Ad Pruyn, I really appreciated his eye for detail. The comments and tips at the end of the project really improved the final product.

The opportunity provided by NS, performing a practically relevant study for a large and well known organisation, is something I am very thankful for. The time I spend working at the office in Utrecht is one I will always look back on with very warm feelings. I really felt as part of the team and enjoyed working among my colleagues every day. Specifically I want to thank my supervisor Mark van Hagen for the interesting research question and the pleasant conversations about my research. Often you here students have a lot of trouble managing the expectations of their organisation and the requirements of the university. With Mark I never had these kinds of problems, this made the collaboration very enjoyable and successful. My special thanks goes out to my second supervisor Jessica Sauren. I can honestly say that I doubt this research would have gotten finished if it weren't for her help and motivational words. Her warm and gentle character was a perfect fit and I really enjoyed working with her.

Now, on to the next phase. What the feature will bring I don't yet know. I look forward to another summer in The Hague, this time as a Master of Science. I hope you will find me at the beach a lot, but of course I also hope to see myself in a job I love. At this point only time will tell. For now I will leave you to it, enjoy reading my thesis.

Brit Moritz I 10-03-2016 I The Hague

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1. Introduction

Our society is becoming more experience focused since the economy shifted from a service economy to an experience economy. In order to get a good review from customers it is no longer enough to provide good service, the experience surrounding the service also has to be excellent.

NS (Netherlands Railways) is a large service provider in the Netherlands. This report describes a study commissioned by NS on how to improve the on-board experience for their customers. In this introduction a short description of the company will be given (1.1) as well as the motivation for the study (1.2). Chapter 2 will go deeper into the available literature and conclude with a model to support the study. Subsequently, chapter 3 will explain the methods that were used to perform the pre-study as well as the results of the pre-study. In chapter 4 the method for the main study is described and in chapter 5 the results are reviewed. Chapter 6 concludes the report with a discussion of the results, conclusions about the study and recommendations for future research and NS.

1.1 NS

NS is a big player on the public transportation market in The Netherlands. Well known for their passenger transportation by train in the entire country and beyond. NS is very customer focused which they explicitly state in their strategy. The first statement in this strategy is that travellers come 1st, 2nd and 3rd in the eyes of NS. The goal is to improve the punctuality of the traveller, the information to the traveller and *the experience of the journey* (NS, 2014). The experience of the traveller is what will be examined in this study. NS has a variety of resources they can use to influence the customer experience. One of which is digital displays in the railcars. At the moment these displays are used to provide travel information and to display NS information like NS products.

Providing travel information is the most important function of the screens, this is the main reason they were placed in the trains. It is important the travel information matches the needs and desires of the travellers. To ensure this NS monitors the customer perception of the travel information every month through a survey among travellers. In 2015 74.3 % of travellers scored the overall travel information a seven or higher on a ten point scale (NS, 2016). NS provides travel information in different formats (website, app, screens on platforms, in-train screens, etc.), the survey contains questions about all the different formats. NS uses the results of this survey to monitor the attitudes about the provided travel information and where needed to adjust it to the needs and desires of the travellers. The design and content of the travel information on the screens will therefore not be the focus of this study. What NS wants to know is whether the content on the screens could be expanded, with for instance advertising and entertainment, to positively influence the travel experience. Unfortunately there is little known about what mix of content is best on an in-train display. Current literature cannot give the answer here and this creates the motivation for this study.

The travellers that use the transportation services of NS have very diverse demographic features. It will therefore be very hard to find a mix of content that matches the different needs and desires of all travellers. NS identifies two main groups of travellers, must and lust travellers, which are divided by their trip purpose.

Must traveller:

Must trip purposes have an obligatory character, factors like location, arrival time, duration and regularity are fixed most of the time. Must travellers value promptness and reliability a lot (van Hagen, 2006).

Lust traveller:

Lust trip purpose activities occur during leisure time, and all factors involved in the trip are less static. Lust travellers desire convenience and comfort most (van Hagen, 2006).

These two types of travellers have a very different motivation for traveling and most likely are in a different state of mind. Van Hagen (2011) discussed the reversal theory of Apter (2007) in relation to must and lust travellers in his dissertation. This theory describes two states of mind, the telic state and the paratelic state. In the telic state people need little arousal, they are more goal-oriented and serious. In the paratelic state people need more stimuli, people are more spontaneous and less goal-oriented. When the desired state is in sync with the experienced situation approach behaviour arises. Must travellers could desire a telic state and lust travellers might pursue a paratelic state. A must traveller might just want information on the displays (low arousal), while the lust traveller might enjoy some entertainment (high arousal).

1.2 Motivation for the study

Previous research has already shown that the environment in which service takes place has a great impact on the review of the service. Zeithaml, Bitner and Gremler (2009) state that customers often rely on the physical evidence to assess their satisfaction with a service during and after consumption. The displays (and the displayed content) could make the customers appreciate the servicescape more, thereby improving their evaluation of the entire service.

Pruyn and Smidts (1998) state that, according to the attentional model of Thomas and Weaver, watching TV in a waiting room would cause customers to pay less attention to time while their cognitive systems are processing the external stimuli. This can lead to less perceived waiting time and therefore a better experience. While travel time is not the same as waiting time the same effect might occur while watching the screens on the train. This could mean that using the displays on the trains the right way could distract the travellers from time and make their experience better.

These displays are better known as *digital signage; "Digital signage consists of screens in a public place showing video. Content typically includes (e.g.) advertisements, community information, entertainment and news."* (Dennis, Newman, Michon, Brakus, & Wright, 2010, p. 1). The Digital Signage Group at POPAI also wrote a definition: *"Digital signage is a network of digital displays that are centrally managed and addressable for targeted information, entertainment, merchandising and advertising."* (POPAI, 2005, p.1). The screens on the trains fit both descriptions, therefore can be seen as digital signage. Dennis, Michon and Newman (2008) performed studies into digital signage in a mall environment. They found that the presence of digital signage had a positive effect on the perception of the mall environment. But they did not look into what kind of content should be offered on the screens.

NS has performed research into content on screens. In that case it was for the screens on the platforms at the train stations. The research (Kramer, 2009) showed that respondents had a better waiting

experience when commercials were shown on the screens. Time perception proved very important for the evaluation of waiting time. Taking travellers' minds of time, getting them to evaluate time passed as shorter, led to a more positive waiting time experience.

An appropriate servicescape can help improve the customer experience (Zeithaml et al., 2009). Taking people's mind of time can also positively contribute (Pruyn & Smidts, 1998). There were many studies looking into this phenomenon in relation to waiting time. Regarding the influence of digital screens, little research can be found. It has been shown that displays can have a positive influence on service quality perception, but which content has the most positive influence is unknown. Regarding in-train displays, no previous research was published. It would therefore be useful to investigate whether showing entertainment and advertisement on the in-train screens would have a positive influence on customer experience. And what combination of content provides the best experience. The following questions were formulated for this study:

What type of content should be offered on the in-train screens to effectively influence the travel experience of travellers?

S1: Does the addition of advertising have a positive effect on travel experience?

S1a: Are different types of advertising remembered (recall/recognition) differently?

S2: Is congruent and non-congruent content reviewed differently and if so how?

S3: Is more travel information always better?

S4: Is time perception influenced by different types of content?

2. Literature review

The digital signage on the trains is a way to improve the customer experience. Van Hagen (2013) describes two ways to influence the customer experience, by focussing on satisfiers and dissatisfiers. For NS, the main goal of the in-train screens is to provide travel information. With this goal the screens are used to keep a dissatisfier on a positive level. Figure 2.1 shows the dimensions of quality. Travel information can be placed in the *security & reliability* category which is the first need. It is interesting to know if other content, entertainment or advertisement could help improve the satisfiers, specifically the experience. NS is interested in using other content to improve the travel experience. Though providing travel information is the number one goal and other content should not interfere with that.

As stated in section 1.2, Zeithaml et al. (2009) stress the importance of the physical evidence for customers to evaluate their satisfaction with a service. It is very important for NS to have the best possible servicescape to make the customer experience while travelling as positive as possible. Zeithaml et al. (2009) describe the physical evidence as "*The environment in which the service is delivered and in which the firm and the customer interact, and any tangible commodities that facilitate performance or communication of the service*" (Zeithaml, Bitner & Gremler, 2009, p. 313). For NS the trains (and their interior) by which the customers are transported are an important part of the physical evidence. They are the servicescape in which the customers consume the service of travelling by train. The screens and the content on the screens are an important part of this servicescape.

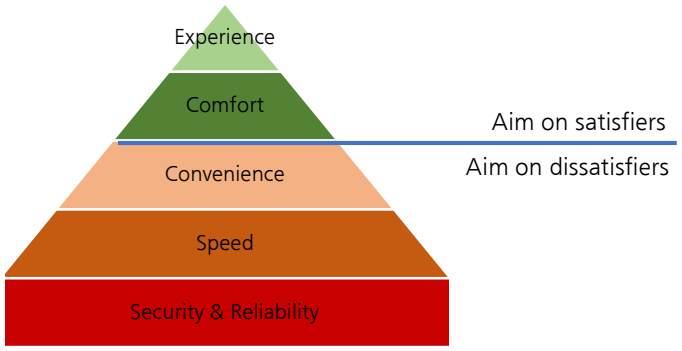

Figure 2.1 Dimensions for quality van Hagen (2013)

In this chapter several studies that focus on the use of digital signage will be accessed (2.1). The possible content for these screens is then studied (2.2) and after this a previous study from NS about the screens on platforms is described (2.3). Based on the literature about digital signage, content and the previous study by NS, hypotheses were formulated which are presented in 2.4, along with the research model.

2.1 Digital signage

Digital signage is a relatively new medium for distributing content. The research into this medium is starting up slowly, but some useful studies have been performed. Dennis, Michon and Newman (2008) performed one of the first exploratory studies on digital signage in the servicescape. They accessed the much used SOR-model (section 2.4) in their conceptual framework and designed their study accordingly. The study looked into the influence of digital signage in a shopping mall. An important finding was that digital signage providing information to shoppers was positively associated with the perception of the mall's environment. They also found that shoppers' mall perception influenced shoppers' emotions. The

affect then in turn impacted approach behaviour. A happy and satisfied customer would be more inclined to use the service again, so called approach behaviour. Another research by Dennis, Newman, Michon, Brakus and Wright (2010) also found that the presence of digital signage had a significant positive influence on perception of a mall environment. Furthermore it had a positive significant effect on the emotions of the participants. The perception of the mall environment and the emotions then had a mediating effect on approach behaviour.

Shimamura, Kaihara, Fujii and Takenaka (2012) performed a study about digital signage in relation to subjective waiting time in a Japanese restaurant. The goal was to find out if digital signage had a positive effect on subjective waiting time. They describe being inspired by the cognitive psychology field, where it has been argued that people feel the passage of time less when they were doing something than when they were doing nothing. They do not cite specific studies, but state that a lot of research has been done about subjective waiting time. Shimamura et al. therefore expected that restaurants can improve customer's subjective waiting time by distracting customers with digital signage presenting information. In the study customers were asked if they thought the waiting time was short or long. Customers with digital signage at their table more often stated the waiting time was short than customers without digital signage. The customers with digital signage also perceived a lower amount of time on average when asked how many minutes they thought they had to wait for their meal.

The main goal of the in-train displays is to provide travel information. With this goal NS focusses more on the utilitarian needs of their customers. From the first insights into the influence of digital signage it appears that digital signage could also have hedonic effects on the users. Specifically more positive perception of the service environment, more positive emotions, approach behaviour and shorter perceived waiting time. These could lead to a better service experience. It would be interesting to find out whether the utilitarian and hedonic outcomes of the displays could be combined.

2.2 Content

It can be assumed that digital signage has a positive effect on perception of the service scape and perceived waiting time. The next step is to find out whether the type of content on the screens can contribute to the positive effect. In the standard terminology white paper from POPAI, content is specified as follows: *"Content broadly describes the media, clips, text, video, and audio that is delivered to display devices by a digital signage system."* (POPAI, 2005). Both Dennis et al. (2010) and Shimamura et al. (2013) used content that was at hand, but did not test different types of content and their influence.

Armstrong (2008) performed a case study on the best use of digital signage. He looked at different brands and their digital signage usage. He showed that successful brands (e.g. Harley Davidson & Footlocker) displayed videos of people using their products in a way customers can relate to. Both brands use the digital signage to grab the consumer emotionally. Hollister (a teen surf brand) is another good example, they do not use specifically created content but have live shots of the beach with the waves rolling in and information about water and air temperature. These brands, Armstrong states, disprove the popular opinion that digital signage is just a digital version of traditional print signage. *"The point is that if a goal of "shopper marketing" is to be responsive to the shopper's "need states", then our view*

of digital signage at retail must broaden to include the shopper's loftiest aspirations as well as their more mundane informational needs." (Armstrong, 2008, p. 35). Armstrong also describes the pitfall of using television commercials on digital signage, these are often not suitable for digital signage. The commercials involve audio which is often not suitable for digital signs and are often too long (30+ sec.). He states that in most cases a commercial has to get its point across in nine seconds or less. This time limit might not be relevant for the case of digital signage in the train because people do not walk by but actually have time to look.

From the study of Armstrong it can be deducted that congruent content is very well appreciated and has a strong emotional impact. Daugherty and Eastin (2001) found similar effects in their study on the impact of internet advertising. Their study was based on the phenomenon Context-Dependent-Memory, which relates recall to the state and context a person was in when information was observed/learned (Eich, 1980). It is argued that people recall the information better in the same context/state than in a different context/state. Daugherty and Eastin (2001) describe context as "*…the physical and psychological environment in which an event or information is experienced.*" (Daugherty & Eastin, 2001, p. 299). The conclusion of their study was that the context in which advertising is viewed is very important to the impact of ads. For instance the attitude towards the ad and the intention to click scores were higher for ads shown on websites with congruent content than for websites with neutral content. Also the recall of the brand and website were better with the context congruent ads than with the ads in a neutral context.

Next to the recall also waiting time satisfaction can be influenced by context congruent content. Borges, Herter and Chebat (2015) studied the effect of television screens in waiting areas on perceived waiting time. They state that consumers perceive unoccupied time as longer than occupied time. In their study they found that television screens in waiting areas increased waiting time satisfaction. Particularly when content displayed was congruent to the waiting context. They also found that consumers payed more attention to the screens when content was congruent. The last part of their study showed that emotions had a mediating effect on perceived waiting time and waiting time satisfaction. Positive emotions led to less perceived waiting time and a higher waiting time satisfaction.

Panic, Cauberghe and De Pelsmacker (2011) performed a study using eye-tracking where participants were simultaneously exposed to an interactive advertisement and a program context on Interactive Digital Television (IDTV). In their conceptual framework they describe that when an ad is placed in a program with similar content, elements of the ad and the program merge. This phenomenon is called 'meltdown' (Furnham, Bergland, & Gunter, 2002). When this occurs, recall performance declines. The congruent stimuli compete with each other for the attention of the viewer. On the other side they also found studies that state that an ad that is preceded by a program with similar content will be better remembered. Panic et al. tested this contradiction in their study. The results showed that when the context program and the advertisement were thematically congruent, participants devote more visual attention to the ad. But when the context program is incongruent with the ad, the involvement with the message was higher. Panic et al. explain that it takes more cognitive capacity to process both stimuli when these are congruent, due to the 'meltdown', therefore it takes viewers longer to understand the

message of the ad. They recommend to use incongruent ads and programs in the IDTV setting. But they do acknowledge that congruent context and content might work better in more traditional settings where only one type of content is shown.

Different types of content apparently can have different effects on the viewers. Another difference might be the type of experience that is evoked by different types of content. Dennis, Brakus, Gupta and Alamanos (2014) studied the role of digital signage as an experience provider in retail spaces. They found that the type of content on the screens influenced the type of experience the viewers had. Content high on sensory (hedonic) cues evoke an affective experience and content high on 'features and benefits' information (utilitarian) evoke an intellectual experience. The affective experience is associated more with the attitude towards the ad and the approach behaviour towards the advertiser than the intellectual experience. Dennis et al. (2014) also found that emotional advertisements are evaluated significantly better than cognitive advertisements.

It seems that when selecting content, congruence with the context can have a positive influence. It could lead to better emotions and attitudes and increase waiting time satisfaction. The positive emotions could even influence the perceived waiting time. A downside could be that congruent content could require more time to be processed by viewers. It would be interesting to see if congruence is important for the content on the screens on the trains. In this case congruence would relate to content that is relevant to the trip travellers are making or the NS brand. Another important aspect is the type of experience provided by the content. What type of experience should be delivered by the digital signage and is this different for different types of travellers? For instance must travellers might want an intellectual experience whereas lust travellers want an affective experience.

2.3 Previous NS research

Kramer (2009) performed a study for NS about content on screens on the platforms at train stations. The goal was to find out if perceived waiting time could be influenced by adding advertisement and infotainment to screens on the platforms. Through two studies she found that adding this content had a positive influence on the appreciation of the waiting time. But it did not influence the perceived waiting time. Since the waiting time cannot be shortened, the best option is to make it as pleasant as possible for the travellers. Adding content could achieve this goal.

Kramer specifically found that respondents had a negative cognitive appreciation of advertising. Respondents actively state they do not want to see ads. But the study showed that respondents in a condition with advertising scored more positive on waiting time appreciation. Respondents experienced more pleasure during the wait, and perceived the waiting time as more useful when advertising was shown. Kramer showed that the cognitive and affective response do not match.

Another interesting finding is that the lust travellers appreciated the informative content more than the must travellers. And the must travellers appreciated the news content better than the lust travellers. This is just one of the indicators Kramer (2009) found which indicates that must and lust travellers have different desires and needs. Therefore travellers respond differently to different types of content. For

instance lust travellers found the waiting time more acceptable when content was shown. For must travellers this was not very important.

Some useful input can be taken from the study of Kramer (2009); Adding content can have a positive influence on waiting time appreciation. Respondents consciously state they dislike advertising, but experience more pleasure and perceive the wait as more useful when advertising is shown. Must and lust travellers have different needs and desires when waiting at the platforms.

It is clear that a fitting servicescape can help improve the customer experience. Because there is no research about the influence of in-train screens and content on these screens specifically it would be useful to investigate whether showing advertising or entertainment on the in train screens will have a positive influence on customer experience. And what combination of content provides the best experience.

2.4 Research model and hypotheses

A frequently used model in environmental psychology is the stimuli-organism-response-model (SOR) which was created by Mehrabian and Rusell (1974). The model depicts the process a consumer goes through when using a service. The provider creates an environment with physical features which are stimuli seen by the consumer. These stimuli influence an internal emotional reaction in the consumer. This emotional state then influences the response a consumer has to the service. Which behaviour the consumer shows, whether they will use the service again, are satisfied etc. In figure 2.3 the SOR-model is shown.

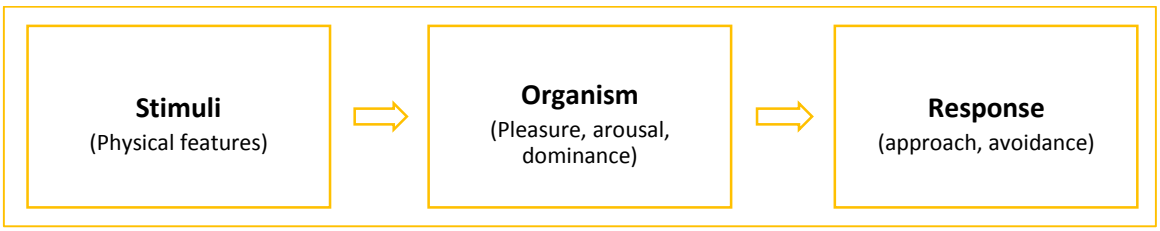

Figure 2.3 SOR-model (Mehrabian and Rusell, 1974)

To conclude the theoretical framework a research model is presented below (figure 2.4), based on the SOR-model. It shows that the *content on digital signage* influences the internal response of the *passenger*. The emotions, attitudes and time perception of the passenger then influence the *response* of the passenger. What type of experience they had (positive/negative, affective/intellectual). Will the passenger use the service again (approach behaviour)? And do the passengers remember the content they saw (recall/recognition). Connected to the research model are the hypotheses, which are described below.

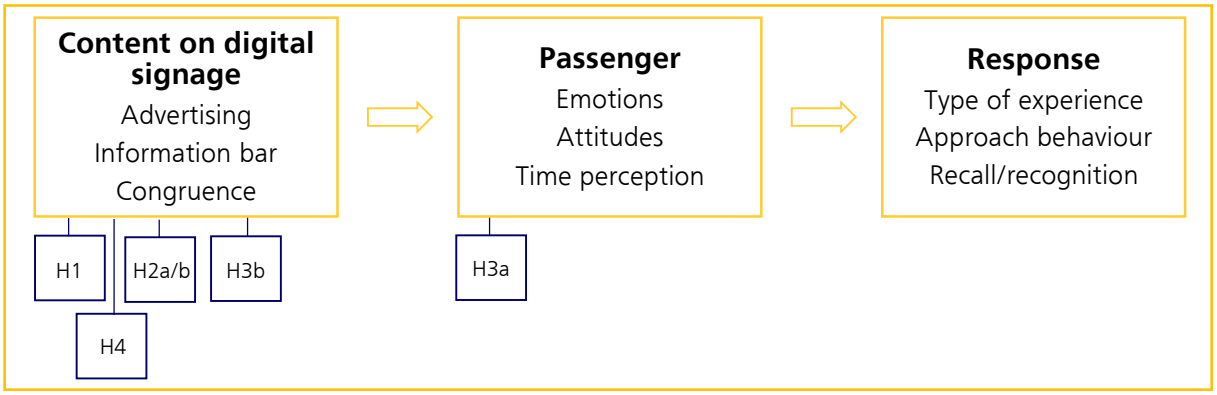

Figure 2.4 Research model

From the studies of Armstrong (2008), Daugherty and Eastin (2001) and Borges et al. (2015) it can be deducted that the congruence of the content with the context in which the content is presented will have an effect on the way the content is reviewed. Congruent content could lead to more positive emotions and attitudes according to these studies. In case of advertising congruence could also lead to a better recall and recognition. These assumptions led to the first hypotheses, described below.

> H1. Congruent content will lead to more positive emotions and attitudes than non-congruent content.
>
> H2a. Congruent advertising will lead to more positive emotions and attitudes than non-congruent advertising.
>
> H2b. Congruent advertising will lead to better recall and recognition than non-congruent advertising.

In the study of Kramer (2009) two interesting advertising related effects were found. Travellers reported a negative attitude towards advertising on platforms at train stations. But when advertising was shown respondents experienced more positive emotions and had more positive attitudes. Based on this contradiction the following two hypotheses were formulated.

> H3a. Travellers will have a negative cognitive appreciation towards showing advertising on the displays.
>
> H3b. Regardless of congruence, showing advertising on the displays will lead to more positive emotions and attitudes.

As introduced in section 1.1, the main goal of the in-train displays is to provide travel information. Adding other types of content might distract from the travel information. Also the travel information might be shown less often. A solution to always provide travel information could be an information bar displayed over all other clips. This information bar could then continuously show relevant travel information. The information on the information bar would always be congruent to the journey and NS. Therefore it can be expected that the information bar would yield the most positive effects when combined with congruent content. This way the context and the two types of content, the information

bar with travel information and clips with other content, would all be congruent to each other. This assumption led to hypothesis four.

> H4. The information bar will have the most positive effects when combined with congruent content.

Shimamura et al. (2012) showed that the presence of digital signage had a positive effect on perceived waiting time. Kramer (2009) found that showing advertising on the platforms at train stations did not have any effect on the perceived waiting time. The question rises whether this effect would be the same for advertising on the in-train screens. Also whether other types of content will have influence on time perception. No hypothesis was formulated because the literature does not give enough insight to formulate one. But the influence of different types of content on time perception is interesting to look into and therefore will be included in the further study.

3. Pre-study

Before starting the design for the main study more insight into the desires and needs of the consumers was required. How important is travel information? Would travellers like to see entertainment and if so what? Is there a preference or dislike for a specific type of commercials? These are some of the questions that led to this pre-study. The pre-study consisted of two parts (focus group and short questionnaire) and gave insight into possible content for the displays. In this chapter the methods used for the two studies are described (3.1), followed by the results of both studies (3.2). At the end a conclusion about the pre-study is given (3.3).

3.1 Method

The first part was a focus group with NS customers. Focus groups are a good method for exploring a new concept (Slocum, 2006). The participants in the focus group travel with NS. Thus ideas for content could be gathered from the end users. Colucci (2007) describes several exercises that can be used to get the most out of a focus group. By more than just talking, the moderator can get more information from the group. A few of these exercises were used in the focus group. For instance "free listing" was used to prevent a cognitive bias. Before the discussion started every participant made a short list of what they would like to see on the displays in the trains. The moderator then started the discussion by reading all the lists out loud and letting people explain and respond. In table 3.1 an overview of the tasks during the focus group is shown.

Table 3.1 Tasks focus group

Task	Description
Short listing	Respondents wrote down their top 5 of topics they want to see on the screens. Afterwards a discussion about all the ideas took place.
Scenario 1. Must traveller	Travel to work. Tuesday at 08.00 o'clock, in a hurry for an appointment.
Scenario 2. Lust traveller	Day trip to the Efteling, left timely, not in a hurry, calm in the train.
Scenario 3. Having a delay	What should be on the screens during a delay?
Commercial rating	Six commercials were shown. Ranging from relevant to irrelevant and from attractive looking to irritating in random order: Kiosk, Calvé, NS, Kruidvat, Transavia and Vanish. Respondents had to rate the commercials, 1 being their favourite to see on the in-train screens and 6 their least favourite.
The perfect mix	The respondents were divided into two groups. They were asked to create a perfect mix of content according to their group.

Participants focus group

The focus group was performed with nine respondents. The respondents all were part of NS panel and were invited via email by the research agency. There was an even division in 'must' and 'lust' travellers (divided by their main trip purpose) and the respondents were a good representation of NS customers (different age, background, etc.). In table 3.2 the travel goal, gender and age of the nine respondents is shown.

Table 3.2 Respondents focus group

Respondent #	Trip purpose	Gender	Age
Respondent 1	Must	Female	30
Respondent 2	Lust	Female	27
Respondent 3	Must	Male	56
Respondent 4	Lust	Male	26
Respondent 5	Lust	Female	25
Respondent 6	Lust	Male	67
Respondent 7	Must	Male	58
Respondent 8	Lust	Female	56
Respondent 9	Must/Lust	Male	37

The last part was a questionnaire to get input from a larger group of NS travellers. The questionnaire mainly focussed on the open ended question: "*What would you like to see on the screens in the train?*". The questionnaire was kept short so the threshold to fill it out was very low, the complete questionnaire can be found in appendix A.

Participants questionnaire

The participants of the questionnaire were invited using the Facebook page of the author. A short message asked for their participation and via a link they went directly to the questionnaire. In total 74 respondents started the questionnaire, 52 respondents filled it out completely, therefore the N for this part of the study is 52. A large part of the respondents belongs to the age group 18-25, this is probably because the author belongs to this age group as well, this could cause some distortion in the results. 18 respondents could be categorized as must travellers, 24 respondents as lust and 10 respondents do not have one main reason for travelling. Half of the respondents are frequent travellers and the other half travel less frequent. The last group consists mainly of lust travellers. The full demographic data can be found in appendix B.

3.2 Results

Focus group

Short listing

Everyone listed some kind of travel information on number one. In total 39 items were written down, from which 22 items were some form of travel information like transfer possibilities, stations where the train will stop and arrival times. Other sorts of content that were listed: the weather, news (3x), special offers NS, NS history, information about route/destinations. Two respondents listed offers/commercials as positive, but two others specifically listed that they did not want to see advertisements.

During the discussion it became clear that everyone found travel information very important. Other clips should not make travellers wait for travel information. The group agreed that the content should be different on short routes than on long routes. Facts about the train (like speed) were also positively reviewed. Overall the respondents seemed a bit reluctant to accept other kinds of content in fear of losing travel information. Respondent 1 was hesitant about moving content, she did not want the distraction during the travel. Respondent 4 offered the idea to implement a split screen, half travel information and half other content.

Preferred content: travel information & facts about the train

Scenario 1. Must traveller

The group agreed that travel information was number one. They wanted information about disruption at their destination, crowdedness at the station, busses not driving etc. They also agreed that news items could be shown. The group agreed that when there is a delay, that information about this has priority over the other content.

Preferred content: travel information & news items

Scenario 2. Lust traveller

For the first scenario the group mostly agreed, the second scenario got a discussion started. Travel information was important, but because they were not in a hurry they were less tenacious about that. Weather reports and entertainment were called. Respondent 3 would like cartoons for the kids, respondent 4 would absolutely not want that. Respondent 2 wanted to be entertained. Respondents 2 and 3 reacted positive to the question if they thought that entertainment would shorten their experienced travel time. Respondent 9 on the other hand did not believe that. Respondents 1 and 4 would like some science facts and respondent 1 would also like art to be shown. It was clear that different types of content were desired.

Preferred content: travel information, weather reports, entertainment (cartoons), science facts & art

Scenario 3. Having a delay

The group was very brief and in agreement about this scenario. They wanted nothing but travel information on the screen. The screen should be an addition to the verbal announcements. They also wanted to see the reason for the delay. Knowing the reason could create understanding and thereby lessen irritation.

Preferred content: only travel information

Commercial rating

The overall opinion on advertising is that no advertising should be shown. The average outcome of the commercial rating is as shown below (1 most favourite – 6 least favourite). Respondent 6 was not taken into this average because he did not understand the exercise and scored all commercials a 6.

1. Kiosk (1.8)
2. NS (2.5)
3. Transavia (2.8)
4. Kruidvat (4.1)
5. Calvé (4.4)

6. Vanish (5.5)

Relevance is very important to the group. The Kiosk is highly rated, the group liked that during the travel they could actually visit the Kiosk and use the offer in the commercial. The Transavia commercial caused a discussion, the women liked it because it was pretty and relaxing, the men did not see the relevance. The group was in agreement about the Vanish commercial, it was ugly to look at and totally irrelevant. Overall the group agreed that when commercials would be shown they should be short. The NS and Transavia commercials were too long, although they were reviewed quite positively. The Kruidvat commercial was short which was good, but it was perceived as ugly and irrelevant. The perfect combination for a commercial on the train would be short, nice to look at and relevant to the travel.

Preferred content: no commercials, if must be than short, nice to look at and relevant commercials

The perfect mix

During this exercise the reluctance of the group towards other content than travel information became clear. At this moment it really became clear that they would rather keep everyone happy by not adding anything to the mix than to irritate one person. The first group came up with a list of three points:

1. Up-to-date travel information
   Arrival time, delays, transfers, speed/temperature, time, position on map
2. Ordinary travel information
   Scheduled constructions
3. Current news
   Short news messages, weather/Buienradar

The first group looked at the mix purely from the consumers' point of view and came up with a mix they thought no one would find irritating. The second group took a more commercial view into account and came up with the following:

1. Travel information route specific
2. Constructions/delays short and long time
3. Art, culture, events
4. News and weather
5. Relevant advertising (linked to travel, on station)

An addition that was made by the second group was that all the content should be plain text, not moving clips.

Overall the group agreed on most topics. Travel information is most important, other content should not disturb this. The other content also should not be too flashy. News and weather are an acceptable addition and for lust travellers some entertainment (art, culture, sports, cartoons, etc.) would be nice. But they emphasized their fear that the amount of travel information would suffer from other content.

Questionnaire

The most important part of the questionnaire was the question to create a top five of content the respondents wanted to see on the screens on the trains. They were given complete freedom to write whatever they wanted to see and were not influenced by suggestions. The first thing that stood out was that almost all respondents had travel information in their top five (sometimes in more than one place). 46 respondents mentioned travel information of some kind and 35 respondents placed it on number one. Obviously travel information is very important and should be priority number one when creating a mix of content for the displays.

Though travel information is very important, 38 respondents suggested other types of content, which are shown in table 3.4. After travel information the news, was listed the most, always in the top three. Another subject that was stated a lot was trivia about the city where the train was going and special places along the way.

Table 3.4 Topics for content

Content	Frequency
Travel information	46
News items	22
Trivia about destination/point along the way	10
Weather (buienradar.nl) for destination	8
Information about train stations	5
Movies	4
Crowdedness per train compartment	4
Music clips	4
Sports (highlights)	4
Art	3
Current time	3
Special deals (for shops at the station/for travelling)	3
Information about NS (trivia and business processes)	3
Train speed	3
Pictures (from the news, or characteristic for Holland)	3

A category could be created by combining train speed, location of the train on a map, temperature inside and outside and current time. This together could be a train information dashboard.

For the two most listed types of content (travel information and news) no significant difference was found between the groups (must vs lust and frequent vs non-frequent traveller). This study therefore does not indicate that different types of travellers want to see different types of content.

3.3 Conclusion

Taking the two parts of the pre-study into account a conclusion can be drawn in relation to the further research. From both studies it is obvious that travel information is the most important content for travellers. At all times this should be the main content and travellers should have easy and frequent access. As stated in section 1.1 NS monitors the attitudes towards the provided travel information

regularly. Therefore the design and the content of the travel information will not be studied, but the frequency with which travel information is shown is interesting to study. Other sorts of content that jump out are news items, the weather and (fun) facts about the travel route, destination and the trains (NS) itself. For the further study the following types of content could be added to the mix:

- News
- Weather
- Facts and figures about the train (speed, position on a map etc.)
- Fun facts and information about the route, destinations and NS
- Clips
    - Sports
    - Art
    - Current events
- Advertising
    - Special offers NS
    - Offers on stations

From the pre-study three extra hypotheses can be formulated for the further research. The respondents in the pre-study stressed the importance of travel information. Not only the presence and correctness but mainly the availability, how often the information is shown, is very important. The respondents want to feel secure and want the travel information shown regularly and with short intervals. Therefore the following hypothesis is added:

> H5: When travel information is shown more often, the mix of content will be more positively evaluated.

The next hypotheses relate to the advertisements shown, specifically the length of the commercials (short max. nine seconds vs long 30+ seconds). The respondents of the focus group were clearly less opposed to the short commercials than the long commercials. This was also one of the findings of Armstrong (2008) described in the literature review. Resulting from the literature study is the expectation that congruent commercials will be reviewed more positively than non-congruent commercials. An interaction might take place between these two aspects of advertising. Leading to a more positive evaluation of short congruent commercials than long congruent and short/long non-congruent commercials.

> H6a: Short commercials will lead to more positive emotions and attitudes than long commercials.
>
> H6b: Short congruent commercials will lead to more positive emotions and attitudes than long congruent and short/long non-congruent commercials.

4. Method main study

The main study consists of respondents evaluating different mixes of video clips in an online questionnaire. This was a 2 (advertising vs no advertising) x 2 (ticker tape vs no ticker tape) x 2 (NS congruent content vs NS non-congruent content) between subjects design. In this chapter the research design will be described.

4.1 Participants

NS has a panel which is used to perform research among travellers. This panel represents the target group of NS well. In total 2889 panel members were asked to participate in the main study. 905 panel members (31%) filled out the questionnaire. After exclusion of respondents that indicated not watching the movie from beginning to end 835 respondents were left. From the respondents 392 (46.9 %) were male and 441 (52.8 %) were female. The age of the respondents varied from 17 to 87. The median is 58 which is relatively high[1]. 56.8 % of all respondents had a higher education (HBO or university).

42.6 % of the respondents travelled weekly, 25.5 % monthly and 31.9 % less than monthly. Most respondents usually spent the travel time reading (40.8 %), looking outside (24.1 %) and calling/texting/going on the internet (10.9 %). A complete overview of the demographic data can be found in appendix C.

Trip purpose

Trip purpose was asked at the beginning of the questionnaire. In appendix C the division in must and lust travellers is displayed. Must travellers were represented by 39.6 % of the respondents and lust travellers by 50.6 %, 8.5 % did not have one particular trip purpose.

The difference between must and lust travellers is specifically interesting for NS, but is less scientifically relevant. Analyses were performed to find the differences. However because of the lack of scientific relevance the results are not published in this paper. They can be found in the annex of this paper.

4.2 Soft launch

The survey was not sent to all panel members at once. First a group of 280 panel members was approached to participate in the soft launch. During the soft launch the response was monitored. It appeared that a large group (31%) of participants did not watch the whole movie. This led to a change in the survey so respondents could not click to the next page while the movie was playing. At the end of the survey respondents were asked to review the survey, the results from those questions were monitored closely during the soft launch. There was no very negative response, therefore nothing else was changed for the full launch.

[1] The age of only 70 % of the respondents is known. It was not allowed by the panel administrator to ask the age of the respondents because this data was already known.

4.3 Research tool

The study was performed using an online survey. First participants had to fill out questions about their travel behaviour, why they travel in general (trip purpose), how often they travel and what they generally do during travel. Then respondents got an introduction for the movie with a short scenario: "*You are on the train from **Amsterdam** to **Nijmegen**, it is 15:00 o'clock. Your seat has a view on the screen on the wall of the train.*" When the participants clicked to the next page the movie automatically started. When it was finished they automatically went to the next page. The movie was presented on an in-train screen to better mimic the environment of the actual screens (figure 4.1). Through a random assignment to one of the eight conditions, respondents were shown one of the eight different movies (figure 4.4). All the movies had three travel information screens, two news items and one weather report. Depending on the condition the other content consisted of three entertaining clips and two commercial (conditions with advertising) or four entertaining clips (conditions without advertising). All the movies ended with a neutral video of an orchard. The duration this clip was shown was adapted to the total length for every movie. This was done to create movies of similar length. The movies had a length of between 03:11 and 03:20 minutes, the exact composition with screenshots of the different clips can be found in appendix D.

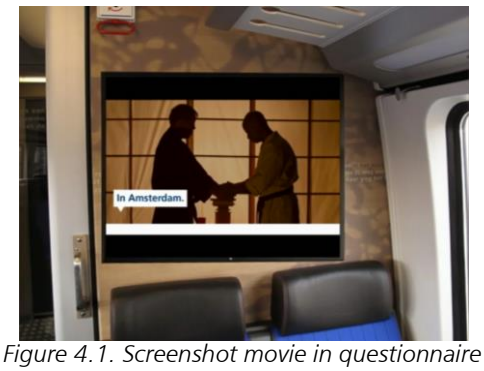

Figure 4.1. Screenshot movie in questionnaire

Advertising

In the movies with advertising two commercials were shown. One short and one long commercial. Armstrong (2008) states that short commercials are better suited for digital signage. The short commercials should be nine seconds or less. The usual television commercials are too long with their thirty plus second format. Both short and long commercials are tested in the movies to study if the same is true for digital signage on the in-train screens. Four commercials were selected using two criteria, *commercial length* and *congruence*:

- Short and congruent: *Kiosk (7 sec.)*
- Long and congruent: *NS (54 sec.)*
- Short and non-congruent: *Mentos (5 sec.)*
- Long and non-congruent: *Sofa Company (45 sec.)*

Information bar

The information bar had the form of a static ticker tape and only showed travel information. Specifically it showed the arrival time at the next station and that the train would arrive on time. In the conditions with the information bar (figure 4.2) the bar was shown over all clips that were not

travel information. The travel information provided here did not depend on the congruence of the condition or the presence of advertising. For all four conditions containing an information bar the travel information was identical. The travel information provided on the information bar could also be found on the travel information screens each movie had. The main difference between conditions with and without information bar was the frequency with which respondents had access to travel information.

Figure 4.2 Information bar "Arrival next station: 15:28 Utrecht Central, on time"

Congruence

The movies congruent to NS had clips that had a relation to the journey by train from Amsterdam to Nijmegen or the organisation NS. For instance a clip about the railway museum. The movies not congruent to NS had clips that had no relation to the journey from Amsterdam to Nijmegen or NS. For example a clip about the Mesdag collection in The Hague. Depending on the presence of advertising each movie had three (advertising) or four (no advertising) clips which did or did not relate to the journey or NS. In figure 4.4 the clips that were used per condition are described. All clips were obtained from the NS database for videos for the displays on platforms at the train stations.

Congruent	Advertising	Information bar
World Cinema Amsterdam Railway museum 400 Station selfies	Short: Kiosk Long: NS	*Arrival next station:* *15:28 Utrecht Central* ***on time***
Congruent	**Advertising**	**No information bar**
World Cinema Amsterdam Railway museum 400 Station selfies	Short: Kiosk Long: NS	
Congruent	**No advertising**	**Information bar**
World Cinema Amsterdam Railway museum 400 Station selfies NS customer service		*Arrival next station:* *15:28 Utrecht Central* ***on time***
Congruent	**No advertising**	**No information bar**
World Cinema Amsterdam Railway museum 400 Station selfies NS customer service		
Non-congruent	**Advertising**	**Information bar**
Paragliding in the dunes Mesdag The Hague Parkour in Winterswijk	Short: Mentos Long: Sofa Company	*Arrival next station:* *15:28 Utrecht Central* ***on time***
Non-congruent	**Advertising**	**No information bar**
Paragliding in the dunes Mesdag The Hague Parkour in Winterswijk	Short: Mentos Long: Sofa Company	
Non-congruent	**No advertising**	**Information bar**
Paragliding in the dunes Mesdag The Hague Parkour in Winterswijk The Keringshuis in Hoek van Holland		*Arrival next station:* *15:28 Utrecht Central* ***on time***
Non-congruent	**No advertising**	**No information bar**
Paragliding in the dunes Mesdag The Hague Parkour in Winterswijk The Keringshuis in Hoek van Holland		

Figure 4.4 Overview of content per condition

Timing

The timing of the content is crucial for NS, especially travel information has to be shown regularly so the travellers feel at ease while traveling. For the distribution of different types of content NS already has a guideline. In figure 4.3 an example of a content loop following NS standards is shown. Five phases can be distinguished during a ride, at the platform, departure, in transit, arrival and at the platform. During the first and last two only travel information may be shown. Only during the "in transit" phase there is room to show other types of content next to travel information, but also during this phase every three minutes travel information has to be shown. This was taken into account when the movies were created.

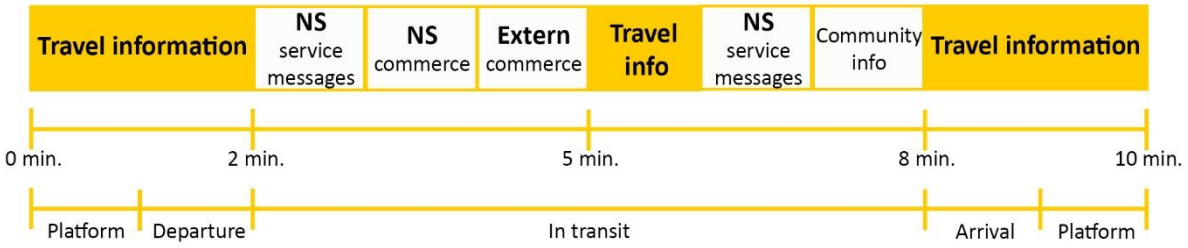

Figure 4.3 Ten minute content loop (van der Hoop, 2014)

Measures

After watching the movie participants had to fill out the rest of the survey. Most of the constructs are the same as the previous research conducted by Kramer (2009). A 5-point Likert scale was used for most constructs, only some bipolar questions did not have this scale. In table 4.1 an overview of the min and max scores can be found for every construct. Also the reliability (Cronbach's alpha) for each construct is listed here.

First there was a control question to check if respondents watched the movie from beginning to end (not a construct). Next the time perception was reviewed. Respondents were asked to give their opinion about the statement 'I thought time was going fast while watching the movie' (1 = strongly disagree – 5 = strongly agree).

The following constructs measured the emotional reaction of the respondents to the movie. This was measured using the PAD-emotions from Russell and Mehrabian (1977). This model measures three dimensions of emotion, pleasure, arousal and dominance. Each dimension is examined using a number of items describing the dimension. Pleasure is represented by six items, for instance *happy – unhappy*. Arousal by two items *relaxed – stimulated* and *excited – calm* and dominance by five items, like *guided – autonomous*. After the emotions the mood of respondents was reviewed using the MSF (Mood Short Form) from Peterson and Sauber (1983). This scale consists of four items like *sad – happy* and *bad mood – good mood*.

Next the behaviour intention was questioned with two items, asking whether respondents would watch again and if they would recommend watching to someone else. These items are part of the approach-avoidance scale of Mehrabian and Russell (1974).

Table 4.1 Reliability and scores constructs

Construct/item	# Items	α	Min	Max	*M*	*SD*
Time perception	1	-	1	5	2.60	1.09
Pleasure	6	.90	1	5	2.92	.79
Arousal	2	.67	1	5	2.83	.92
Dominance	5	.70	1	5	2.87	.50
Mood	4	.91	1	5	2.99	.84
Behaviour	2	.84	1	5	2.44	1.06
Utilitarian consumer attitude	3	.95	1	5	2.69	1.05
Hedonic consumer attitude	3	.95	1	5	2.87	1.04
Attitude mix	7	.93	1	5	2.76	.93
Travel information usefulness	1	-	1	5	4.21	1.07
Travel information frequency	1	-	1	5	2.84	1.04
Travel information clearness	1	-	1	5	4.15	1.02
Attitude news items	3	.96	1	5	3.33	1.27
Attitude commercials in general	6	.80	1	5	2.96	.75
Recall short commercials (*Kiosk* & *Mentos)*	1	-	1	3	1.61	.82
Recall long commercials (*NS* & *Sofa Company)*	1	-	1	3	1.59	.79
Recognition commercial *Kiosk*	1	-	1	2	1.24	.43
Recognition commercial *Mentos*	1	-	1	2	1.18	.39
Recognition commercial *NS*	1	-	1	2	1.16	.37
Recognition commercial *The Sofa Company*	1	-	1	2	1.28	.45
Attitude short commercials (*Kiosk* & *Mentos)*	7	.93	1	5	2.10	.88
Attitude long commercials (*NS* & *Sofa Company)*	7	.92	1	5	2.79	1.09

The hedonic and utilitarian consumer attitude scale (Batra & Ahtola, 1991) was used to assess the attitude toward the time spent watching the movie. To test whether the time was perceived as useful (hedonic) and/or pleasant (utilitarian) six items were used. Another attitude that was tested was the attitude towards the mix of clips. Respondents were asked to give their opinion on the statements following "I think the mix of clips on the screens is…" which was followed by seven items, among which amusing, harassing and beautiful.

Following these attitudes were three questions about travel information, namely perceived usefulness, frequency and clearness. The travel information usefulness and clearness were scored on the usual five point scale, from bad to good. The travel information frequency was scored on a five point scale from too little to too much information. Therefore the optimal score for travel information frequency is a three.

Then the attitude towards the use of news items on the screens was asked. Three items were used, for instance *uninteresting – interesting*. The question was asked in general, not specific to this movie. 'I would find news items on the in-train screens…' This formulation was used because the attitude towards the two used news items is less important than the general opinion towards news items on the in-train screens.

The last part of the questionnaire related to advertising. First the general attitude toward commercials on the in-train screens was asked. A construct was created using six statements about seeing commercials, for instance "I think it is no problem to see commercials on the train" and "I think advertisement on the train is too commercial". After the general attitude the *recall* and *recognition* of the commercials was tested. The recall question asked respondents which commercials they remembered, this was an open-ended question. To quantify the data the response on this question was scored. Respondents got a one when they did not remember the commercial at all, a two when they remembered the product but not the specific brand, for example they recalled a couch commercial but did not mention the brand Sofa Company, and a three when they wrote down the correct brand. This was done for the short and long commercials separately creating two variables, the *recall for the short commercials* and *recall for the long commercials*. The recognition questions were only asked in the advertising condition. This was a yes/no question with pictures of the commercials that were shown in the movie. The last questions were about the attitude about a specific commercial. Only respondents who answered yes at the recognition question got to these questions. This last construct consists of seven items from the attitude towards the ad scale by Cho, Lee and Tharp (2001). The items were formulated as the statements "I think the commercial is…", followed by *not interesting – interesting*, *not fun – fun*, etc. Again these were separated for the short and long commercials. Since recall, recognition and commercial specific attitudes were asked separately for the short and long commercials these three variables will also be analysed within subjects in the results section. It will be interesting to see whether respondents assess short and long commercials differently within the congruent and non-congruent conditions.

The last question in the questionnaire was an open-ended question asking whether the respondent had any more ideas or remarks regarding possible content on the screens. The questionnaire as filled out online by the respondents (in Dutch) can be found in appendix E.

Table 5.1 MANOVA's (Wilks' Lambda) for emotions and mood and attitudes

	Emotions and mood					**Attitudes**				
	F	*df*	*Error df*	*p*	*Sig. constructs*	*F*	*df*	*Error df*	*p*	*Sig. constructs*
Advertising	4.47	4	823	**.001**	*Pleasure*	3.36	4	823	**.010**	*Behaviour* *Utilitarian consumer attitude* *Hedonic consumer attitude* *Attitude mix*
Information bar	2.18	4	823	**.069**	*Pleasure* *Arousal*	1.10	4	823	.358	
Congruence	2.11	4	823	**.078**	*Arousal*	1.10	4	823	.354	
*Advertising * Information bar*	.89	4	823	.470		1.41	4	823	.227	
*Advertising * congruence*	.86	4	823	.486		.65	4	823	.624	
*Information bar * congruence*	.62	4	823	.648		.62	4	823	.650	
*Advertising * information bar * congruence*	.83	4	823	.505		.95	4	823	.432	

Table 5.2 MANOVA's (Wilks' Lambda) for commercials and travel information

	Commercials					**Travel information**				
	F	*df*	*Error df*	*p*	*Sig. constructs*	*F*	*df*	*Error df*	*p*	*Sig. items*
Advertising	-	-	-	-	*Att. Commercials in general*	1.22	3	824	.302	
Information bar	1.17	5	288	.326		9.44	3	824	**.000**	*Travel information frequency*
Congruence	35.91	5	288	**.000**	*Recall long commercials* *Recognition long commercials* *Attitude short commercial* *Attitude long commercial*	7.61	3	824	**.000**	*Travel information usefulness* *Travel information frequency* *Travel information clearness*
*Advertising * information bar*	-	-	-	-		.12	3	824	.950	
*Advertising * congruence*	-	-	-	-		.29	3	824	.831	
*Information bar * congruence*	1.15	5	288	.336		1.14	3	824	.331	
*Advertising * information bar * congruence*	-	-	-	-		.05	3	824	.985	

5. Results main study

In this chapter the results of the main study are described. First four 2 (advertising vs no advertising) x 2 (information bar vs no information bar) x 2 (congruent vs non congruent) multivariate analyses of variance (MANOVA's) were performed on four groups of constructs. The four groups of constructs are described below. In table 5.1 and 5.2 the results of these MANOVA's are shown.

1. *Emotions and mood* (pleasure, arousal, dominance and mood)
2. *Behaviour and attitudes* (behaviour, utilitarian consumer attitude, hedonic consumer attitude and attitude mix)
3. *Commercials* (attitude commercials in general, recall, recognition, attitude short and long commercials)
4. *Travel information* (usefulness, frequency and clearness)

Two constructs were not included in one of the groups because these did not belong to one of the groups, namely *time perception* and *attitude towards news items*. The interaction effects with *commercial length* are also not represented in the MANOVA tables, because these interactions take place within conditions with advertising. These will be discussed in section 5.4.

In the MANOVA advertising showed significant main effects on *emotions and mood* F (4, 823) = 4.47, p = .001 and *attitudes* F (4, 823) = 3.36, p = .010. Information bar had (marginally) significant main effects on *emotions and mood* F (4, 823) = 2.18, p = .069 and *travel information* F (3, 824) = 9.44, p = .000. Congruence had three (marginally) significant main effects. On *emotions and mood* F (4, 823) = 2.11, p = .078, *commercials* F (5, 288) = 35.91, p = .000 and *travel information* F (3, 824) = 7.61, p = .000. No significant interaction effects were found between advertising, information bar and congruence on one of the four groups.

For all the (marginally) significant results found in the MANOVA's three-way univariate analyses of variance (ANOVA's) were conducted, to explore the impact of the three independent variables *advertising*, *information bar* and *congruence* on the different constructs. Only the significant results, shown in table 5.1 and 5.2, will be described in this chapter. The effects are shown in tables and described shortly. First all the main effects for advertising (5.1), information bar (5.2) and congruence (5.3) are discussed. Next the interaction effects (5.4) will be described. Subsequently the open-ended question (5.5) about what people want to see is reviewed. The chapter is concluded with a reflection on the hypotheses (5.6).

5.1 Advertising

The first independent variable that will be described is *advertising*. The differences between the respondents in conditions with and without advertising were reviewed. The topics that had significant effects were *time perception*, *emotions*, *behaviour and attitudes* and *commercials*. These will be described in this section.

Time perception

The presence of advertising had a main effect on *time perception* (table 5.3). Respondents with advertising (*M* = 2.50, *SD* = 1.05) found that time was going less fast while watching the movie than respondents without advertising (*M* = 2.68, *SD* = 1.09).

Table 5.3 Main effect advertising on time perception

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Time perception	Advertising	5.76	1	826	.017	.007

Emotions

The only emotion that was influenced by advertising was *pleasure*. The significant main effect is shown in table 5.4. The respondents with advertising (*M* = 2.84, *SD* = .78) experienced less pleasure than the respondents without advertising (*M* = 2.99, *SD* = .79) while watching the movie.

Table 5.4 Main effect advertising on pleasure

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Pleasure	Advertising	7.90	1	826	.005	.009

Behaviour and attitudes

A main effect on *behaviour* was found which is shown in table 5.5. Respondents without advertising (*M* = 2.55, *SD* = 1.06) were more inclined to watch clips on the in-train screens again than respondents with advertising (*M* = 2.33, *SD* = 1.06).

On *utilitarian consumer attitud*e a significant main effect of advertising was found (table 5.5). The respondents without advertising (*M* = 2.81, *SD* = 1.02) think watching the movie during a trip on the train is more useful than the respondents with advertising (*M* = 2.56, *SD* = 1.06). Advertising also has a main effect on *hedonic consumer attitude* (table 5.4). Respondents without advertising (*M* = 2.97, *SD* = 1.02) found looking at the movie more pleasant than the respondents with advertising (*M* = 2.78, *SD* = 1.06).

Advertising had a main effect on the *attitude towards the mix* (table 5.5). Again respondents without advertising (*M* = 2.86, *SD* = .90) were more positive than respondents with advertising (*M* = 2.67, *SD* = .96).

Table 5.5 Main effects advertising on behaviour and attitudes

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Behaviour	Advertising	8.52	1	826	.004	.010
Utilitarian consumer attitude	Advertising	12.27	1	826	.000	.015
Hedonic consumer attitude	Advertising	6.79	1	826	.009	.008
Attitude mix	Advertising	8.12	1	826	.004	.010

Commercials

A main effect of advertising was found on the *general attitude towards commercials* (table 5.6). The effect is just short of being significant (p = .057). Respondents without commercials (M = 3.00, SD = .73) were significantly more accepting of advertising in general than respondents with advertising (M = 2.91, SD = .76). The respondents without advertising were neutral about whether commercials can be shown on the screens, the respondents with advertising had a slightly more negative attitude. The overall mean of all respondents was 2.96, showing respondents were relatively neutral about commercials in general.

Table 5.6 Main effect advertising on attitude commercials in general

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Attitude commercials in general	Advertising	3.64	1	826	.057	.004

To conclude, advertising has main effects on seven constructs. In all cases the respondents with advertising were more negative than the respondents without advertising. Respondents experienced less pleasure, found the movie less useful and enjoyable and were less inclined to watch again when confronted with the commercials. Hypothesis 3a and 3b have not been confirmed. Respondents had a neutral cognitive attitude about commercials. And respondents had more negative emotions and attitudes in the conditions with advertising than in the conditions without advertising.

5.2 Information bar

Next the independent variable *information bar* will be discussed. Main effects for *emotions* (*pleasure* and *arousal*) and *travel information* (*frequency*) will be reviewed. For all construct ANOVA's were performed.

Emotions

Pleasure is significantly influenced by the presence of the information bar (table 5.7). Respondents without the information bar (M = 2.98, SD = .80) experienced more pleasure than respondents with the information bar (M = 2.86, SD = .77). *Arousal* also shows a main effect in relation to information

bar (table 5.7). Respondents without the information bar (*M* = 2.75, *SD* = .94) were less aroused than respondents with the information bar (*M* = 2.90, *SD* = .90).

Table 5.7 Main effects information bar on pleasure and arousal

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Pleasure	Information bar	4.60	1	826	.032	.006
Arousal	Information bar	5.20	1	826	.023	.006

Travel information

The presence of an information bar had no effect on the perceived *usefulness of the travel information* and only a marginally significant effect on *travel information clearness* (*F* (1, 826) = 2.98, *p* = .085). It does have a main effect on the appreciation of the *travel information frequency* (table 5.8). When the information bar is present (*M* = 2.97, *SD* = 1.04) respondents were more positive about the frequency with which travel information is shown than without the information bar (*M* = 2.70, *SD* = 1.02). The optimal score for travel frequency is a three on the five point scale, because one is too little information and five is too much. Respondents with the information bar were very close to the perfect score with *M* = 2.97. Apparently the information bar is a step in the right direction concerning the amount of travel information.

Table 5.8 Main effects information bar on travel information frequency

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Travel information frequency	Information bar	13.16	1	826	.000	.016

From the main effects that the information bar had it is clear that the *emotions* are negatively influenced by its presence. On the other hand the *travel information frequency* got almost the perfect score from respondents with the information bar. Hypothesis 5 therefore is partly confirmed. Since more travel information not only has a positive effect, but also negative effects.

5.3 Congruence

The last manipulated independent variable is *congruence*, the effects on emotions, *travel information* and *commercials* are described here. Main effects were found for the construct *arousal* and for the three items of *travel information*. Also there were main effects on the recall, recognition and attitudes towards the long and short commercials. Again for all constructs described ANOVA's were performed. Only the last described analysis is a repeated measures test for the *attitude short commercial* vs the *attitude long commercial*.

Emotions

The only emotional response on congruence was a significant main effect on *arousal* (table 5.9). Non-congruent movies led to less aroused respondents (*M* = 2.76, *SD* = .91) than the congruent movies (*M* = 2.90, *SD* = .92), which led to respondents who were more neutral on the arousal scale.

Table 5.9 Main effect congruence on arousal

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Arousal	Congruence	4.07	1	826	.044	.005

Travel information

A remarkable effect is observed between congruence and the three items about travel information. No significant differences were expected here, but on all three congruence has a main effect. First there is a significant difference on the rating of *travel information usefulness* (table 5.10). The respondents with non-congruent movies (*M* = 4.35, *SD* = .95) reviewed the usefulness of the information more positive than the respondents with congruent movies (*M* = 4.06, *SD* = 1.17). The second main effect is on *travel information frequency* (table 5.10). Here the respondents with congruent movies (*M* = 2.94, *SD* = 1.04) were more positive about the information frequency than the respondents with non-congruent movies (*M* = 2.74, *SD* = 1.04). The last main effect is on *travel information clearness* (table 5.10). The respondents with non-congruent movies (*M* = 4.24, *SD* = .97) thought the travel information was more clear than the respondents with congruent movies (*M* = 4.05, *SD* = 1.05).

Table 5.10 Main effect congruence on travel information items

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Travel information usefulness	Congruence	15.24	1	826	.000	.018
Travel information frequency	Congruence	7.76	1	826	.005	.009
Travel information clearness	Congruence	7.20	1	826	.007	.009

In conclusion, respondents in the non-congruent condition assessed the usefulness and clearness of the travel information more positive. But respondents in the congruent condition were more positive about the travel information frequency. Though there was no difference in the provided travel information between the congruent and non-congruent conditions.

Commercials

Recall & recognition

In figure 5.1 the frequencies for recall for the four commercials is shown. For all commercials it is clear that the recall is not very high, especially Sofa Company has a very low brand recall. NS has a

relatively high brand recall, but a low product recall. There is no significant difference between the short commercials in recall. But the long commercials do differ significantly on the independent variable *congruence* (table 5.11). The congruent long commercial (NS) (M = 1.83, SD = .91) was significantly better recalled than the non-congruent long commercial (Sofa Company) (M = 1.36, SD = .58). Recall was scored from one (no recall) to three (brand recall).

In figure 5.2 the recognition of the commercials is depicted. Compared to the recall the scores are reversed, the recognition is quite high for most commercials. On the *recognition of the long commercials* congruence has a main effect (table 5.11). The NS commercial (congruent) (M = 1.94, SD = .25) is significantly better recognized than the Sofa Company commercial (non-congruent) (M = 1.72, SD = .45). Recognition was scored on a two point scale (1 = yes, 2 = no). For the analysis the scores were reversed so a higher score reflected a higher recognition.

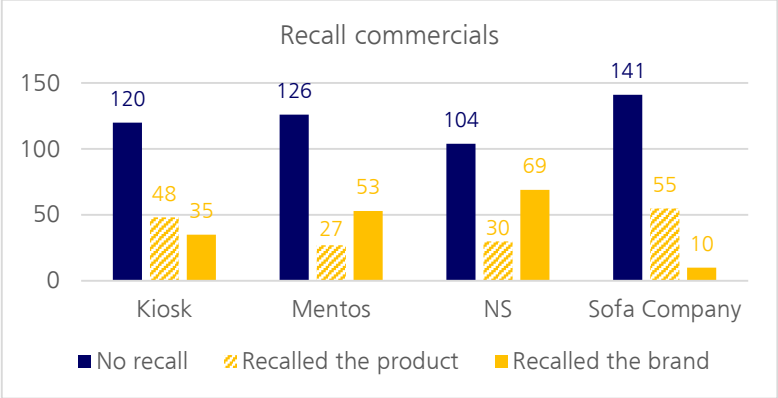

Figure 5.1 Recall frequencies for each commercial

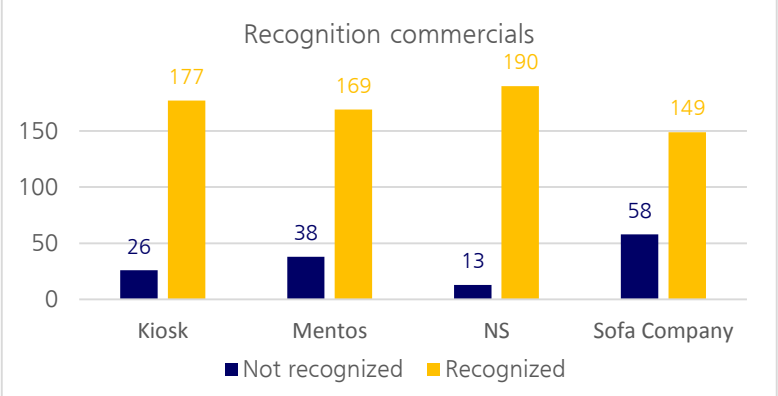

Figure 5.2 Recognition frequencies for each commercial

Table 5.11 Main effects of congruence on recall, recognition and attitude specific commercials

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Recall long commercials	Congruence	37.55	1	405	.000	.085
Recognition long commercials	Congruence	35.58	1	406	.000	.081
Attitude short commercials	Congruence	7.43	1	342	.007	.021
Attitude long commercials	Congruence	127.77	1	335	.000	.276

Attitude toward specific commercials

Two ANOVA's were performed for the *attitude about the short* and *long commercials*, the independent variables were *information bar* and *congruence*. This because only the conditions with advertising had to answer these questions. On the *attitude scale for the short commercials* (Kiosk and Mentos) a main effect was found (table 5.11). The respondents with the congruent commercial (Kiosk) (*M* = 2.22, *SD* = .92) have a significantly more positive attitude about the commercial than the respondents with the non-congruent commercial (Mentos) (*M* = 1.96, *SD* = .81). But still both groups are on the negative side of the scale for attitude towards both commercials.

On the *attitude scale for the long commercials* a main effect also occurred (table 5.11). The congruence of the long commercials has a very large effect on the attitude towards those commercials. Respondents with the congruent commercial (NS) (*M* = 3.28, *SD* = .98) were a lot more positive about the commercial than respondents with the non-congruent commercial (Sofa Company) (*M* = 2.13, *SD* = .86).

The last test that was performed for main effects relating to commercials was a repeated measures test for attitude towards the short commercials vs attitude towards the long commercials. This test shows there is a significant difference in attitude between the short and long commercials, *F* (1, 293) = 124.29, *p* = .000; η_p^2 = .298. Respondents have a more positive attitude towards the long commercials (*M* = 2.82, *SD* = 1.11) than towards the short commercials (*M* = 2.12, *SD* = .88).

In conclusion, congruence has the strongest effect when in relation to commercials. The attitudes towards the movie are not influenced by congruence. Other than commercials the only two effects are on *arousal* and *travel information*. The differences in rating for the travel information items are surprising, because there is no difference in the information that was presented. Hypothesis 1 cannot be confirmed. Only a main effect on arousal was found but no effects on other emotions or attitudes were found. Hypotheses 2a and 2b are confirmed since congruent advertising was more positively reviewed and better recalled and recognized. Hypothesis 6a had not been confirmed. The results actually show the opposite reaction from respondents. Long commercials were better evaluated than short commercials.

5.4 Interaction effects

Now that all main effects have been described the interaction effects will be reviewed. Interaction plots were added to help visualize the effects. Four interactions will be discussed. All of which have not been described in the MANOVA's (tables 5.1 and 5.2). The first interaction effect is between *advertising* and *information bar* on the *attitude news items* construct. This was one of the constructs not assigned to one of the four MANOVA groups. The last three effects take place within the conditions with advertising, therefore are not shown in the MANOVA. These show interactions between *commercial length* and *congruence*.

Advertising * information bar

Advertising and *information bar* have an interaction effect on *attitude news items* (table 5.12). To investigate which groups differ significantly, a post-hoc test was performed using a Bonferroni test. The respondents without advertising and information bar were significantly more positive about the construct than the other respondents (figure 5.3).

Remarkable is that the means of the different groups of respondents are all relatively high compared to other constructs. The mean for the total construct is 3.33, which is above the middle of the five point scale. It appears that respondents are positive about seeing news items on the in-train screens.

Table 5.12 Interaction effect on attitude news items

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Attitude news items	Advertising * information bar	4.91	1	826	.027	.006

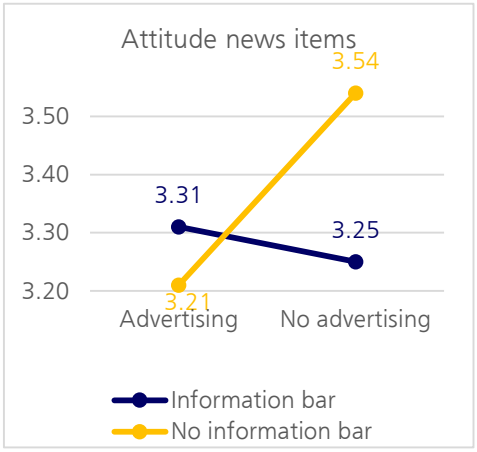

Figure 5.3 Interaction effect between advertising and information bar on attitude news items

Commercial length * congruence

Recall and recognition

A repeated measures test was performed with *congruence* and *information bar* as between subjects factors and *recall short* and *recall long* as within subjects variables. An interaction effect between *commercial length* and *congruence* was found (table 5.13). The long congruent (NS) commercial was

recalled significantly better than the other commercials (figure 5.4). Both congruent and non-congruent commercials differ significantly within subjects, but the effects are opposite. The short non-congruent (Mentos) commercial is significantly better recalled than the long non-congruent (Sofa Company) commercial. In the congruent condition the long commercial is better recalled than the short commercial, since respondents were "travelling" with NS it could be expected that this commercial would be better recalled than the Kiosk commercial.

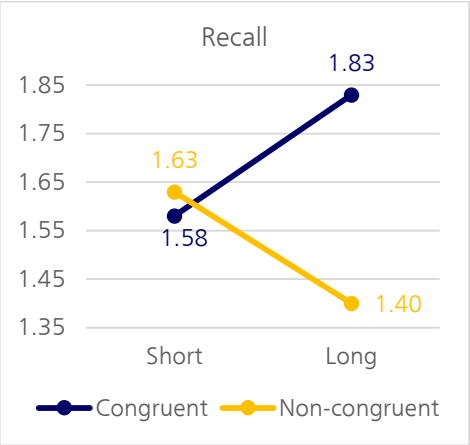

Figure 5.4 Interaction effect between commercial length and congruence on recognition

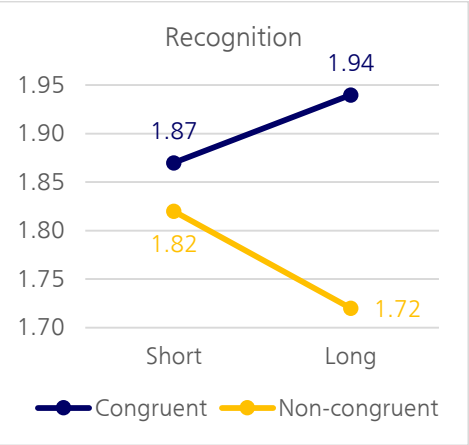

Figure 5.5 Interaction effect between commercial length and congruence on recall

Another repeated measures test was performed to see if there was a difference in recognition between short and long commercials within subjects (score: 1 = not recognized, 2 = recognized). There was an interaction effect between *commercial length* and *congruence* on *recognition* (table 5.13). The congruent long commercial (NS) is significantly better recognized than all other commercials (figure 5.5).

Attitude toward specific commercials

A repeated measures test was performed with *congruence* and *information bar* as between subjects factors and *short commercials* and *long commercials* as within subjects variables. An interaction effect between *commercial length* and *congruence* gives more insight in the different review of the short and long commercials (table 5.13). The long congruent commercial was reviewed significantly more positive than the short commercial (figure 5.6), even on the positive side of the scale. Respondents were negative about all other commercials.

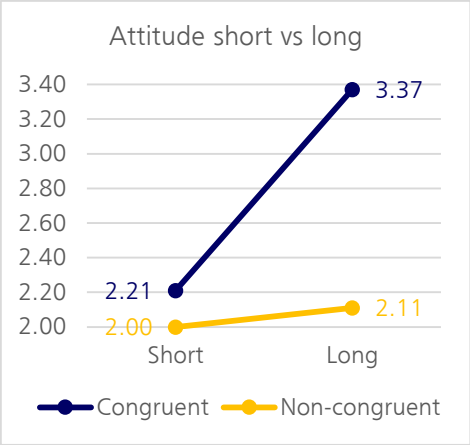

Figure 5.6 Interaction effect between congruence and length of the commercials on the attitude about the commercials

Table 5.13 Interaction effects on recall, recognition and commercial attitudes

Construct	Condition	*F*	*df*	*Error df*	*P*	η_p^2
Recall	Commercial length * congruence	24.17	1	404	.000	.056
Recognition	Commercial length * congruence	12.13	1	406	.001	.029
Attitude short vs long commercials	Commercial length * congruence	82.54	1	293	.000	.220

Hypothesis 4 was not confirmed, since no significant interaction effect was found between information bar and congruence. Hypothesis 6b also has not been confirmed. The most positive evaluated commercial was the long congruent (NS) commercial, not the short congruent (Kiosk) commercial.

5.6 What do you want to see?

The open ended question that concluded the questionnaire "Do you have any ideas what you want to see on the screens in the train, or what definitely not?" is described shortly. Two factors were quantified: the importance of travel information (1 – desires only travel information, 2 – mentions travel information, 3 – does not mention travel information). And whether news and weather report were mentioned (1 – news, 2 – weather report, 3 – news & weather report, 4 – none). In table 5.14 the results are shown. It again becomes clear that travel information is very important, 20.5 % of the respondents only want travel information on the screen. More than half of the respondents felt the need to express the need for travel information on the screens in the open ended question. In total almost 15 % of respondents would like to see news items and 10 % wants to see the weather report for their destination. The news items scored positive on the *attitude news items* scale and a substantial amount of respondents specifically mentioned news as something they would like to see. The news does have to be current to be useful.

Table 5.14 Frequencies mentioning travel information, news and weather

		Frequency	%
Travel information	1. Only travel information	171	20.5
	2. Mentioned travel information	269	32.2
	3. Did not mention travel information	395	47.3
	Travel information total (1+2)	*440*	*52.7*
News & Weather report	1. News	80	9.6
	2. Weather report	45	5.4
	3. News & Weather report	40	4.8
	4. None	670	80.2
	News total (1+3)	*120*	*14.4*
	Weather total (2+3)	*85*	*10.2*

Something that was mentioned a lot was that respondents want to see calm images. Movies should not be flashy and fast and there should not be too many changes between clips. For instance the clip about the World Cinema Amsterdam is mentioned multiple times as being to flashy. And many respondents said they would like clips to be on longer to have a calmer experience. Another remark sparked by the World Cinema Amsterdam clip is that respondents do not want to see violent movies.

What respondents do want to see is a map that shows the journey of the train, like google maps. Also culture and art is mentioned multiple times as pleasant to watch. The screens are seen as a good platform for (young) artists. The last subject that is worth mentioning is that a lot of respondents want to see more transfer possibilities than currently shown. For instance transfers to busses, streetcars and subways.

5.7 Hypotheses

To conclude the results chapter the hypotheses defined in section 2.4 and 3.3 are reviewed. In table 5.15 an overview is shown of which hypotheses were confirmed and which were rejected based on the results. H1 and H4 were not confirmed because no (or not enough) relevant effects were found. H2a and H2b were confirmed in section 5.3. Congruent advertising was evaluated more positively and was better recalled and recognized than non-congruent advertising. H3a and h3b were not confirmed. In section 5.1 the results of the cognitive attitude towards commercials were relatively neutral. Also in section 5.1 it is shown that advertising has negative effects on emotions and attitude, not positive effects. H5 showed ambiguous results. Information bar had a negative effect on pleasure but a positive effect on travel information frequency. Therefore the hypothesis was partially confirmed. H6a and H6b have not been confirmed. Respondent were more positive about the long commercials than short commercials. Thus the opposite of H6a had been found. H6b is partially disproved, not the short congruent commercial, but the long congruent commercial is evaluated most positive.

Table 5.15 Overview hypotheses

Hypotheses		Confirmed	Section
H1	Congruent content will lead to more positive emotions and attitudes than non-congruent content.	-	5.3
H2a	Congruent advertising will lead to more positive emotions and attitudes than non-congruent advertising.	+	5.3
H2b	Congruent advertising will lead to better recall and recognition than non-congruent advertising.	+	5.3
H3a	Travellers will have a negative cognitive appreciation towards showing advertising on the displays.	-	5.1
H3b	Showing advertising on the displays will lead to more positive emotions and attitudes.	-	5.1
H4	The information bar will have the most positive effects when combined with congruent content.	-	5.4
H5	When travel information is shown more often, the mix of content will be more positively evaluated.	+/-	5.2
H6a	Short commercials will lead to more positive emotions and attitudes than long commercials.	-	5.3
H6b	Short congruent commercials will lead to more positive emotions and attitudes than long congruent and short/long non-congruent commercials.	-	5.4

6. Conclusion & recommendations

The goal of this study was to explore possible types of content for the in-train screens. Through a pre-study first insights were gathered into the needs and desires of the users. In the main study three types of content were tested; *advertising*, *information bar* and *congruent/non-congruent* content. 835 respondents filled out the online questionnaire and watched one of eight different movies. The results showed some interesting effects regarding the three conditions on the emotions and attitudes of the respondents. The implications of these effects are discussed here. Finally an answer will be formulated to the main question:

What type of content should be offered on the screens in the train to effectively influence the travel experience of travellers with different trip purposes?

In this final chapter the main findings are presented (6.1). After which the results are discussed in relation to the used literature (6.2). Next the general conclusion is presented (6.3). Subsequently the recommendations for future research are given (6.4) and the chapter is concluded with practical recommendations for NS (6.5).

6.1 Main findings

The main findings are presented here following the same structure as the results section. First the impact of advertising will be reviewed. Second the influence of the information bar will be described and finally the effects of congruence will be presented.

Advertising

The respondents with advertising were shown two commercials in the mix of clips, one short (max. 9 sec.) and one long (30+ sec.). Depending on whether it was a congruent or non-congruent condition the respondents saw a Kiosk commercial (short and congruent) and a NS commercial (long and congruent) or a Mentos commercial (short and non-congruent) and a Sofa Company commercial (long and non-congruent).The overall presence of advertising had negative effects on many constructs. Respondents with advertising perceived time as going less fast and experienced less pleasure. They also had less intention to watch the screens again. Their attitudes (utilitarian, hedonic, towards the mix and towards commercials in general) were all more negative than those of respondents without advertising. Respondents in the advertising conditions were clearly more negative about the movies. Which indicates that travellers do not want to see advertising on the in-train screens.

Information bar

To test whether providing more frequent travel information would lead to more positive effects an information bar was added to the movies. The information bar (when present) was the same for all conditions. Always showing the same travel information: "*Arrival next station: 15:28 Utrecht Central, on time*". The information bar showed ambiguous results in the main study. In both the pre- and main study it became clear that travel information is the most important content on the screens according to travellers. On one hand the respondents enjoyed the movies less when the information

bar was added. But on the other hand the frequency with which travel information was shown was better (almost perfectly) evaluated. An explanation could be that the cognitive information in the information bar prohibits the respondent from having a more affective experience. Thereby keeping the minds of the respondents more on the practical side of travelling, thus leading to less experienced pleasure. Looking at the opinions of the respondents about the importance of travel information it would be better to add the information bar and accept the decrease in pleasure that goes with it. Adding the information bar will also take away another concern that respondents remarked. The movies on the train should be tranquil and not change too fast. Respondents would like to see clips that are longer (rather 2 – 3 minutes than half a minute), so it feels calm. The contradiction there is that they do not want many changes between clips, but do want to see travel information regularly. The information bar could offer a solution here, since travel information will be provided constantly and the clips could still be long and calm.

Congruence

The respondents in the congruent conditions saw clips that all related to the travel. They were either related to the trip from *Amsterdam* to *Nijmegen*, or were related to NS. In the non-congruent conditions the clips were not related to the trip nor NS. As described above the commercials shown in the congruent condition were congruent and non-congruent in the non-congruent condition. It was expected that congruent content would have a positive influence on emotions and attitudes. Congruence particularly gave a lot of insight into the evaluation of the commercials shown in the movies. Especially the non-congruent commercials were evaluated negatively. The commercial from NS was reviewed positively. It therefore is likely that travellers would be all right with NS showing commercials for its own products. This is in line with what Daugherty and Eastin (2001) found in their research into context congruent internet advertising. Not only the attitude was better towards the NS commercial, the recall and recognition were better as well. The last interesting finding is that the long commercials were more positively evaluated than the short commercials. This is the opposite of what Armstrong (2008) stated in his analysis of good content for digital signage. An explanation might be that the long commercial were attractive and therefore more enjoyable to look at than the short more pragmatic looking commercials. Dennis et al. (2014) found similar results in their study. Emotional commercials were significantly better evaluated than cognitive commercials. To conclude if commercials have to be shown, these should be congruent to NS and/or the trip and should be long, calm and nice to look at.

6.2 Discussion

Looking at the conditions, *advertising* shows some predictable effects, presenting a logical story. The opposite reaction compared to the study of Kramer (2009) on advertising on platforms at train stations is remarkable. In that study respondents experienced more pleasure and perceived the waiting time more useful when advertising was added. In this study advertising only had negative effects on the emotions and attitudes of the respondents. This could be explained by the reversal theory of Apter (2007). While waiting at the platform people might need more stimuli to get to their desired state of mind, where on the train travellers do not need as much stimulation to reach their desired state of mind. This could lead to positive effects of advertising on the platforms and negative effects of advertising on the train.

Another aspect that could have a role in this difference is that travellers pay for the train, not for the waiting time on the platforms. They could feel like it is not fair to be shown advertising when they paid for the service.

Because respondents emphasize the importance of travel information it was expected that an *information bar* would reduce the amount of stress because of the constant presence of travel information. The main effect on arousal shows the opposite. Respondents without the information bar are less aroused. An explanation could be that the respondents were less distracted by the movies and were more aware of the practical side of travelling due to the constant reminder of the information bar. The cognitive system would still be processing the time related stimuli instead of the distracting stimuli (Pruyn & Smidts, 1998). The question is if this effect would be the same during a real trip by train. On the computer at home, travel information was needed less and might have led to constant reminder of travel time. On the train travellers really want travel information, so maybe the opposite of this effect would occur in the real situation. This would be something to test in the real situation.

Congruence showed strong effects in relation to the commercials. In the studies reviewed in the literature review (section 2.2) it became clear that congruence can help users to process the content better and that content will be reviewed more positively. The positive effects of congruence were only found in relation to advertising in this study. Congruence had almost no main effects on the overall emotions and attitudes that were tested. Maybe these effects did not occur because respondents were not actually travelling past the cities which were mentioned in the congruent conditions. The conclusion for now would be that congruence is especially important for advertising on the in-train screens, but for other content it does not have an impact on emotions, attitudes and in the end travel experience.

Congruence did show some unexpected effects as well. Respondents with non-congruent movies where less aroused than respondents with congruent movies. This effect was not expected but there might be a logical explanation. The congruent movies started with a clip from World Cinema Amsterdam. This clip is quite flashy and shows some fight scenes. Respondents mentioned violence in the open-ended question as something they would not want to see. This could have caused the higher level of arousal.

Congruence also had main effects on all the travel information items. Respondents in the non-congruent condition were more positive about the travel information usefulness and clearness. The respondents in the congruent condition were more positive about the travel information frequency. The different opinion on travel information usefulness could have been caused by the contrast between irrelevant content and relevant travel information. Because of the non-useful clips the travel information might appear extra useful. This could be supported by the fact that respondents in the congruent condition evaluate the travel information frequency more positively. Since everything they saw was related to the trip. The different cities they passed were named in some of the clips, this apparently enhanced the perceived travel information frequency. The non-congruent movies were scored lower on frequency and therefore when the travel information came on it might have been perceived as more useful. The effect on travel information clearness is a bit harder to explain. It might be that because the clips in the congruent condition blend more with the travel information resulting in the difference being less clear and therefore the travel information is perceived as less clear. Maybe the clips about the cities the train

passed were also perceived as travel information by some respondents. For NS it is interesting that the attitude about travel information can be influenced by the congruence of the content. It would be interesting to find out what the best combination would be and which of the three items is most important for the customer satisfaction (frequency, usefulness or clearness).

The interaction effects of *commercial length* and *congruence* on recall and recognition can be explained logically. The long congruent commercial (NS) is recalled and recognized the best. This could be expected because the respondents are part of the NS panel, so familiar with the brand. And the setting of the study was in a service provided by NS. The long non-congruent commercial (Sofa Company) is recalled and recognized least. This is a relatively new brand in The Netherlands and the commercial is not as well-known as the NS commercial, which has been on television a lot. The *attitude towards specific commercials* shows that the better recalled and recognized commercial is also perceived more positively.

Trip purpose is an important factor NS uses to better understand travellers. In the pre-study (chapter 3) a first insight into the different needs and desires regarding content on the in-train screens for must and lust travellers is revealed. The results of the main study on the subject of trip purpose are described in the annex. The main conclusion from those results is that must travellers are more negative about almost all constructs than lust travellers. Combining the results of the pre- and main study it can be argued that different content should be offered to the must and lust travellers. Which could be implemented by displaying a different mix of content during peak and of-peak hours.

Limitations

In the ideal situation the study would have been performed in an experiment using the actual screens on the train. Due to limitations of the current content management system for the screens this was not possible. Therefore the online survey was chosen as the research method. Using an online survey had the benefit that a large group of travellers could be approached to participate in the study and led to the large N of 835. Another advantage was that the online survey could be longer than a survey taken on the train, because there was less time pressure than on the train. The downside is that participant were not actually in a travel situation during the study and had to imagine the mind set of travelling by train. Also that participants had to watch the whole three minute movie, where on the train they could have chosen to watch parts. This is probably a reason for the low scores on many constructs. Respondents got bored watching the whole movie, and thought it took too long. In a real travel situation they would have only watched clips they found interesting. The small effect sizes could also be a consequence of the used method. In the real setting stronger effects might have been found. Overall the online survey was a good way to perform the study due to the limitations. But it would be very interesting, when possible in the future, to perform a follow-up study on the train.

Another limitation is that the NS panel was used to approach respondents. The people that are subscribed to the panel did so voluntarily. So they are probably more involved with NS than the average traveller. It could mean they are more critical about the service or that some respondents are train/NS enthusiasts who are more positive.

6.3 General conclusion

Looking back at the questions that led to this study some answers can be formulated to what type of content should and should not be shown on the in-train screens. Advertising has negative effects on travellers' emotions and attitudes and would probably lead to a less positive travel experience. It also is the only tested type of content with an effect on time perception and this effect is a negative one. If advertising has to be shown than the commercials should be congruent, long (30+ sec), calm and nice to look at. This composition will not only lead to the most positive response, but will also have the highest level of recall. The congruence of the content only showed effects on the evaluation of the commercials, but limited results on the overall evaluation of the movies. Travel information is of great importance to travellers. Travellers especially stress the importance of having frequent access to travel information. Adding an information bar with travel information would positively influence travel experience. Since the frequency with which travel information is shown gets almost the perfect score when the information bar is present. This should not be a moving but rather a static ticker tape as to not over stimulate travellers. Some other content can be shown. For instance news items and weather reports are positively evaluated. Also information about the train and journey would be welcome.

6.4 Recommendations for future research

The subject of digital signage has not been explored much, so there are a lot of possibilities for future research. The only previous studies into the impact of the presence of digital signage were performed in commercial areas (shopping mall/restaurant). Here Dennis et al. (2010) and Shimamura et al. (2013) found positive hedonic effects. It would be interesting to find out if the impact is similar in other public areas. Train stations, platforms and trains are a good start to test the impact of the presence of digital signage. But also other public places could be interesting, for instance hospitals, super markets, city hall, town squares etc.

The next step would be to find out what type of content would fit the different contexts in which digital signage can be used. Dennis et al. (2014) found that different types of content led to a different experience for the users. And this study gave some insights into do's and don'ts for content on digital signage on the train. But there is a lot more to explore. It would be beneficial to perform more (field) studies in different types of environments. Here diverse types of content could be tested and conclusions could be drawn for each type of environment. The use of the environment and the expected/desired experience in the environment will probably lead to different needs for type of content.

The last recommendation hails more directly from this study. To get more insight in the actual effects of content on the in-train screens a field study should be performed. With the insights gained from this study a field study on the trains could be designed. NS wants to introduce a new content management system to the trains. When this happens the limitations that prohibited this study from being performed on the train will be gone. A future field study could yield even more definitive results.

6.5 Recommendations for NS

The recommendations for NS will be stated shortly below:

- No advertising on the in-train screens. Travel experience will be negatively influenced when commercials are shown on the screens.
    - NS could advertise for its own products. But then it should be attractive calm commercials, made specifically for the silent train screens.
- Add an information bar when showing clips other than travel information. Although the positive effects of the entertainment might be smaller, travellers will feel more secure when they can always see travel information.
- Clips that are shown should be calm and the clips should not change to fast, therefore longer clips would be better (+/- 2 minutes)
- News items and weather reports will be a welcome addition. These have to be current, otherwise they will be irritating.
- A train dashboard could be added. Showing travellers the journey of the train on a map, the speed of the train and some facts and figures.

Regarding the must and lust travellers the last recommendation can be formulated, based on the results in the annex:

- Must travellers want other content than lust travellers. It would therefore be sensible to look into a different mix during peak hours and off peak hours. For instance during peak hours only travel information, news and weather. And during off peak hours entertainment and some NS advertising could be added.

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Appendix

A. Questionnaire pre-study

Welkom

Dit is een korte vragenlijst waarin ik te weten wil komen wat u graag op de schermen in de trein zou willen zien. Dit is onderdeel van mijn vooronderzoek naar dit onderwerp en kan worden gezien als een brainstorm waarin u geen foute antwoorden kan geven.

Eerst volgen drie vragen over uw situatie en vervolgens één openvraag over de gewenste onderwerpen op de schermen.

Tot welke leeftijdsgroep behoort u?

- ○ 18-25
- ○ 26-35
- ○ 36-45
- ○ 46-55
- ○ 56-65
- ○ 65+

Om welke reden reisde u de afgelopen 12 maanden het meest met de trein?

- ○ Van en naar mijn werk
- ○ Zaken- dienstreis, bezoek congres en dergelijke
- ○ Van en naar school, studie, opleiding, stage
- ○ Bezoek aan familie, kennissen
- ○ Winkelen
- ○ Vakantie of een uitstapje
- ○ Sport of hobby
- ○ Anders, namelijk: _____
- ○ Zeer wisselend, er springt niet één reden uit

Hoe vaak reist u gemiddeld met de trein?

- ○ 4 dagen per week of vaker
- ○ 1-3 dagen per week
- ○ 1-3 dagen per maand
- ○ 6-11 dagen per jaar
- ◉ 3-5 dagen per jaar
- ○ 1 of 2 dagen per jaar
- ○ Ik heb de afgelopen 12 maanden niet met de trein gereisd
- ○ Ik reis nooit met de trein

Wat zou u graag willen zien op de schermen in de trein?
Als u een top 5 van onderwerpen zou mogen bedenken welke u graag op de schermen zou willen zien, wat zou deze dan zijn? Denk hierbij puur aan wat u zelf leuk/interessant/handig vindt om te zien.

Geef waar u daar behoefte aan hebt uitleg over uw keuze.
(Wanneer u geen 5 onderwerpen wilt zien kunt u er natuurlijk ook minder in vullen)

1.

2.

3.

4.

5.

Bedankt voor het invullen van deze vragenlijst!

Klik op de onderstaande pijl om de vragenlijst af te sluiten.

B. Demographic data pre-study

		Frequency
Age group	18 – 25	39
	26 – 35	10
	36 – 45	1
	46 – 55	-
	56 – 65	2
	65+	-
Trip purpose	From and to work*	8
	Business trips, etc.*	1
	From and to school*	9
	Visiting family and friends**	19
	Shopping**	-
	Vacation / trip**	5
	Sport or hobby**	-
	Otherwise, namely…	1
	Not one reason stands out	9
Travel frequency	4 days a week or more	12
	1-3 days a week	14
	1-3 days a month	15
	6-11 days a year	6
	3-5 days a year	3
	1 or 2 days a year	2
	I did not travel the last 12 months	-
	I do not travel by train	-

* *Must travel motive* ** *Lust travel motive*

C. Demographic data main study

		Frequency	%.
Sex	Male	392	46.9
	Female	441	52.8
	Unknown	2	.2
Age	17 – 25	35	4.2
	26 – 35	53	6.3
	36 – 45	72	8.6
	46 – 55	97	11.6
	56 – 65	174	20.8
	> 65	158	18.9
	Unknown	246	29.5
Education	Elementary school	5	.7
	Lower vocational education, VMBO, LTS	14	1.9
	MULO, MAVO, VMBO-T	70	9.4
	MBO	120	16.1
	HAVO	53	7.1
	HBS, VWO	45	6
	HBO	214	28.6
	University	211	28.2
	Other	15	2.0
Trip purpose	From and to work*	255	30.5
	Business*	44	5.3
	From and to school*	32	3.8
	Visiting family/friends**	186	22.3
	Shopping**	33	4
	Vacation or a day out**	189	22.6
	Sports or hobbies**	14	1.7
	Not one reason	71	8.5
	Other	11	1.3
Travel frequency	4 days a week or more	183	21.9
	1-3 days a week	173	20.7
	1-3 days a month	213	25.5
	6-11 days a year	231	27.7
	1 or 2 days a year	30	3.6
	I did not travel by train the last 12 months	5	.6
Activities during travel	Reading	341	40.8
	Relaxing or sleeping	41	4.9
	Looking outside	201	24.1
	Working	44	5.3
	Talking to fellow travellers	50	6
	Calling/texting/going on the internet	91	10.9
	Listening to music	35	4.2
	Other	32	3.8

** Must travel motive ** Lust travel motive*

D. Composition movies

The compositions for the eight different movies. Clips in blue change with the different conditions. The composition of the movies with *information bar* is the same as the ones without an information bar, with the addition of the information bar which can be seen below. The compositions are shown without information bar.

Information bar

Aankomst volgend station: 15:28 Utrecht Centraal **op tijd**

1. (no) Information bar – Advertisement – Congruent

1. World Cinema Amsterdam

2. Travel information

3. Spoorwegmuseu

4. Kiosk commercial

5. News item (1)

6. Travel information

7. 400 stationselfies

8. Weather report

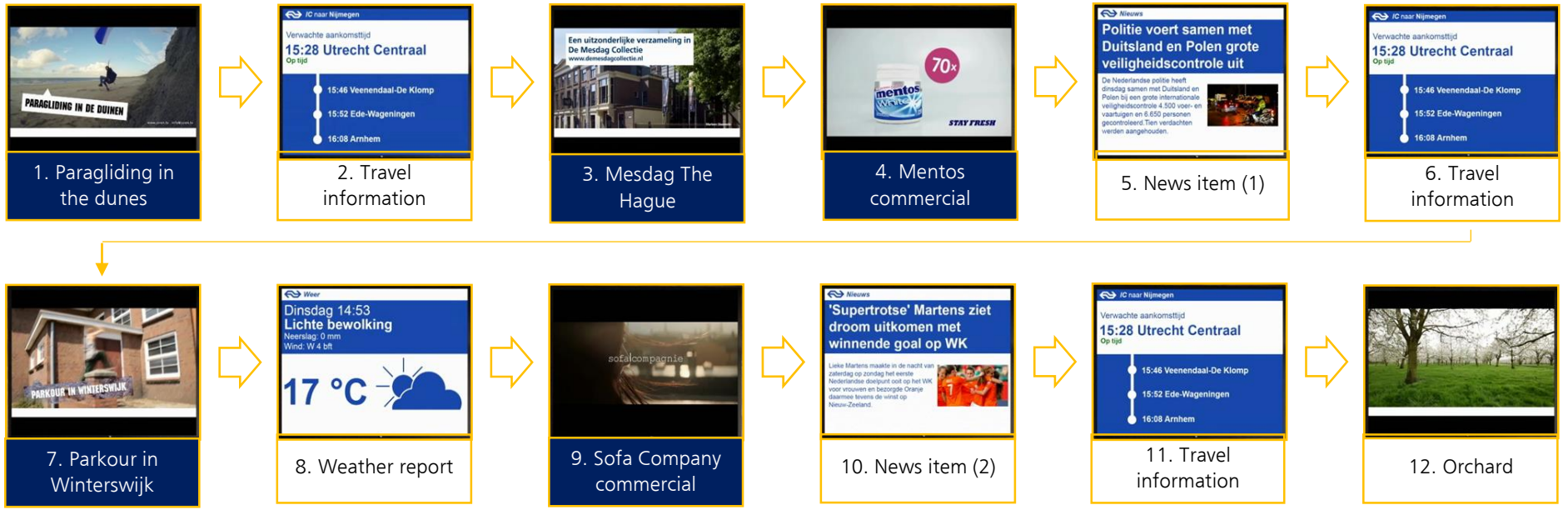
9. NS commercial

10. News item (2)

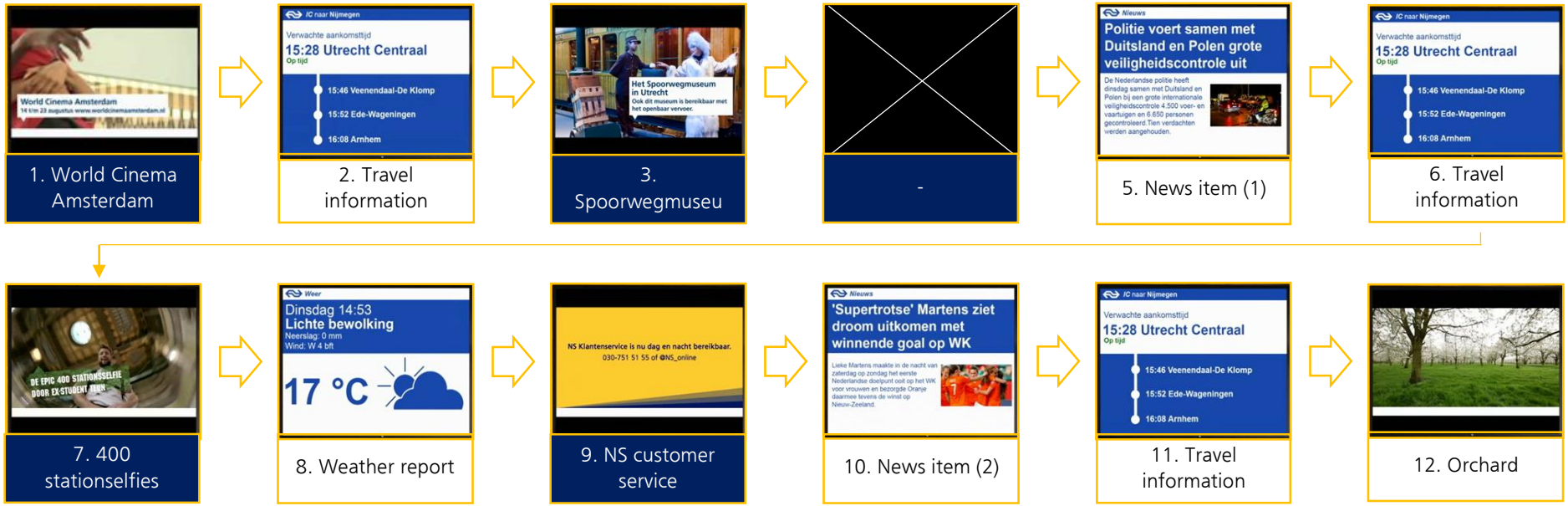
11. Travel information

12. Orchard

2. (no) Information bar – Advertisement – Non-congruent



3. (no) Information bar – No advertisement – Congruent



4. (no) Information bar – No advertisement – Non-congruent

E. Questionnaire main study

NS Panel

Om welke reden reisde u de afgelopen 12 maanden het meest met de trein?

- Van en naar werk
- Zaken- dienstreis, bezoek congres en dergelijke
- Van en naar school, studie, opleiding, stage
- Bezoek aan familie, vrienden, kennissen
- Winkelen
- Vakantie of een uitstapje
- Sport of hobby
- Zeer wisselend, er springt niet één reden uit
- Anders, namelijk:

Hoe vaak heeft u de afgelopen 12 maanden binnen Nederland met de trein gereisd?

- 4 dagen per week of vaker
- 1-3 dagen per week
- 1-3 dagen per maand
- 6-11 dagen per jaar
- 1 of 2 dagen per jaar
- Ik heb de afgelopen 12 maanden niet met de trein gereisd
- Ik reis nooit met de trein

Hoe besteedt u doorgaans uw tijd in de trein?

- Lezen
- Ontspannen of slapen
- Naar buiten kijken
- Werken
- Praten met medereizigers
- Bellen/sms'en/whatsappen/internetten
- Muziek luisteren
- Anders, namelijk:

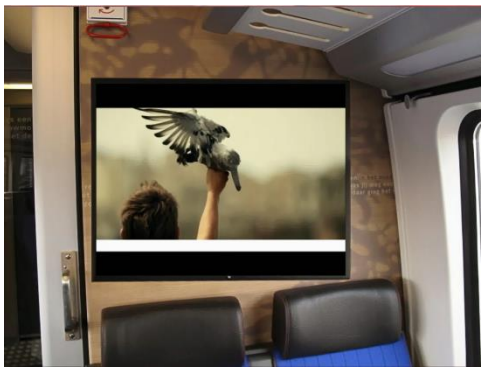
Op de volgende pagina wordt een video aan u getoond.

Neem bij het kijken van de video het volgende scenario in uw hoofd:

U zit in de trein van Amsterdam naar Nijmegen, het is 15:00 uur. U heeft een zitplaats met zicht op het scherm dat in de trein hangt.

Er zit geen geluid bij de video, net als in de trein, het is dus niet nodig uw boxen aan te zetten.

Als u klaar bent om de video te bekijken klikt u op de onderstaande pijl, de video zal dan automatisch starten. Kijkt u alstublieft het hele filmpje af. Nadat het filmpje is afgelopen gaat u automatisch door naar de volgende vraag.



Heeft u het filmpje van begin tot einde bekeken?

- ○ Ja
- ○ Nee

Geef aan in hoeverre u het eens bent met de onderstaande stelling:

	Helemaal mee oneens	Mee oneens	Niet mee eens / niet mee eens	Mee eens	Helemaal mee eens
Ik vond de tijd snel gaan toen ik naar het filmpje keek	○	○	○	○	○

Tijdens het bekijken van het filmpje voelde ik mij...

Ongelukkig	○	○	○	○	○ Gelukkig
Blij	○	○	○	○	○ Geïrriteerd
Wanhopig	○	○	○	○	○ Hoopvol
Ontevreden	○	○	○	○	○ Tevreden
Verveeld	○	○	○	○	○ Ontspannen
Melancholisch	○	○	○	○	○ Voldaan

Tijdens het bekijken van het filmpje voelde ik mij...

Ontspannen	○	○	○	○	○ Geprikkeld
Opgewonden	○	○	○	○	○ Kalm
Lusteloos	○	○	○	○	○ Opgefokt
Begeleid	○	○	○	○	○ Zelfstandig
Beïnvloedbaar	○	○	○	○	○ Invloedrijk
Volgzaam	○	○	○	○	○ Leidend

Tijdens het bekijken van het filmpje voelde ik mij...

Volgend	○	○	○	○	○ Sturend
Gewichtig	○	○	○	○	○ Onder de indruk
Onderdanig	○	○	○	○	○ Dominant
Verdrietig	○	○	○	○	○ Vrolijk
Slecht gehumeurd	○	○	○	○	○ Goed gehumeurd
Geïrriteerd	○	○	○	○	○ Aangenaam
Gedeprimeerd	○	○	○	○	○ Opgewekt

Geef bij de onderstaande stellingen aan in hoeverre u het ermee eens bent:

	Helemaal mee oneens	Mee oneens	Niet mee eens / niet mee oneens	Mee eens	Helemaal mee eens
Ik voel me onzeker tijdens het bekijken van de filmpjes	○	○	○	○	○
Ik voel me rustig tijdens het bekijken van de filmpjes	○	○	○	○	○
Ik zou een volgende keer weer naar de filmpjes op het scherm kijken	○	○	○	○	○
Ik zou anderen aanbevelen naar de filmpjes te kijken	○	○	○	○	○
Ik voel me goed geïnformeerd tijdens het bekijken van de filmpjes	○	○	○	○	○

De tijd dat u tijdens uw reis van Amsterdam naar Nijmegen naar de filmpjes hebt gekeken was...

Nutteloos	○	○	○	○	○ Nuttig
Waardeloos	○	○	○	○	○ Waardevol
Onzinnig	○	○	○	○	○ Zinnig
Onplezierig	○	○	○	○	○ Plezierig
Onaangenaam	○	○	○	○	○ Aangenaam
Fijn	○	○	○	○	○ Niet fijn

De mix van filmpjes op de schermen tijdens de reis van Amsterdam naar Nijmegen vind ik...

	Helemaal mee oneens	Mee oneens	Niet mee eens / niet mee oneens	Mee eens	Helemaal mee eens
...storend	○	○	○	○	○
...plezierig	○	○	○	○	○
...amusant	○	○	○	○	○
...mooi	○	○	○	○	○
...vervelend	○	○	○	○	○
...gezellig	○	○	○	○	○
...irritant	○	○	○	○	○

De aangeboden reisinformatie vind ik:

Nutteloos ○ ○ ○ ○ ○ Nuttig

De hoeveelheid aangeboden reisinformatie vind ik:

Te weinig ○ ○ ○ ○ ○ Te veel

De aangeboden reisinformatie vind ik:

Onduidelijk ○ ○ ○ ○ ○ Duidelijk

Nieuwsitems op de schermen in de trein vind ik...

Oninteressant	○	○	○	○	○ Interessant
Nutteloos	○	○	○	○	○ Nuttig
Waardeloos	○	○	○	○	○ Waardevol

In hoeverre bent u het eens met de onderstaande stellingen?

	Helemaal mee oneens	Mee oneens	Niet mee eens / niet mee oneens	Mee eens	Helemaal mee eens
NS heeft het beste met haar reizigers voor	○	○	○	○	○
Ik vind het geen probleem reclames in de trein te zien	○	○	○	○	○
Ik vind reclames in de trein te commercieel	○	○	○	○	○
Externe partijen mogen reclame maken in de trein	○	○	○	○	○
NS mag zelf reclame maken in de trein	○	○	○	○	○
Ik vind reclames in de trein misleidend	○	○	○	○	○

Welke reclames kunt u zich herinneren?

○ Ik heb de volgende reclames gezien:

○ Ik heb geen reclames gezien

Herinnert u zich deze reclame?

○ Ja
○ Nee

Herinnert u zich deze reclame?

○ Ja
○ Nee

Deze reclame vind ik:

Oniteressant	○	○	○	○	○ Interessant
Saai	○	○	○	○	○ Vermakelijk
Waardevol	○	○	○	○	○ Waardeloos
Niet leuk	○	○	○	○	○ Leuk
Niet informatief	○	○	○	○	○ Informatief
Slecht	○	○	○	○	○ Goed
Nutteloos	○	○	○	○	○ Nuttig

Herinnert u zich deze reclame?

○ Ja
○ Nee

Herinnert u zich deze reclame?

○ Ja
○ Nee

Deze reclame vind ik:

Oniteressant	○	○	○	○	○ Interessant
Saai	○	○	○	○	○ Vermakelijk
Waardevol	○	○	○	○	○ Waardeloos
Niet leuk	○	○	○	○	○ Leuk
Niet informatief	○	○	○	○	○ Informatief
Slecht	○	○	○	○	○ Goed
Nutteloos	○	○	○	○	○ Nuttig

Heeft u nog ideeën over wat u graag op de schermen in de trein zou willen zien, of wat juist niet?

Hartelijk dank voor het invullen van de vragenlijst.

Klikt u a.u.b. nog op 'verder' om de evaluatie (één vraag) in te vullen over deze vragenlijst.

Voordat u op 'verder' klikt kunt u onderstaand nog meer lezen over het doel van dit onderzoek.
Dit is uiteraard niet verplicht.

Wetenschappelijk karakter
Dit onderzoek is uitgevoerd in opdracht van NS in samenwerking met de Universiteit Twente. Zoals u wellicht is opgevallen heeft deze vragenlijst daardoor een wetenschappelijk tintje gekregen. De wetenschappelijke vragen die gebruikt zijn (bijvoorbeeld de vragen hoe u zich voelde tijdens het bekijken van het filmpje) mogen helaas niet gedeeltelijk worden afgenomen en kunnen daardoor soms langdradig overkomen.

Toepassing resultaten
NS gaat aan de hand van dit onderzoek op zoek naar het optimale aanbod op de beeldschermen in de trein. Verschillende combinaties filmpjes getoond in de vragenlijst zullen ons inzicht geven in vragen die hier relevant voor zijn zoals: Wat is een goede combinatie van informatie, vermaak en nieuws? Mogen er reclames getoond worden en door wie? En nog veel meer.

De Universiteit Twente verrijkt met deze resultaten de literatuur over aanbod op beeldschermen in publieke ruimtes en de behoeften van gebruikers van deze beeldschermen.