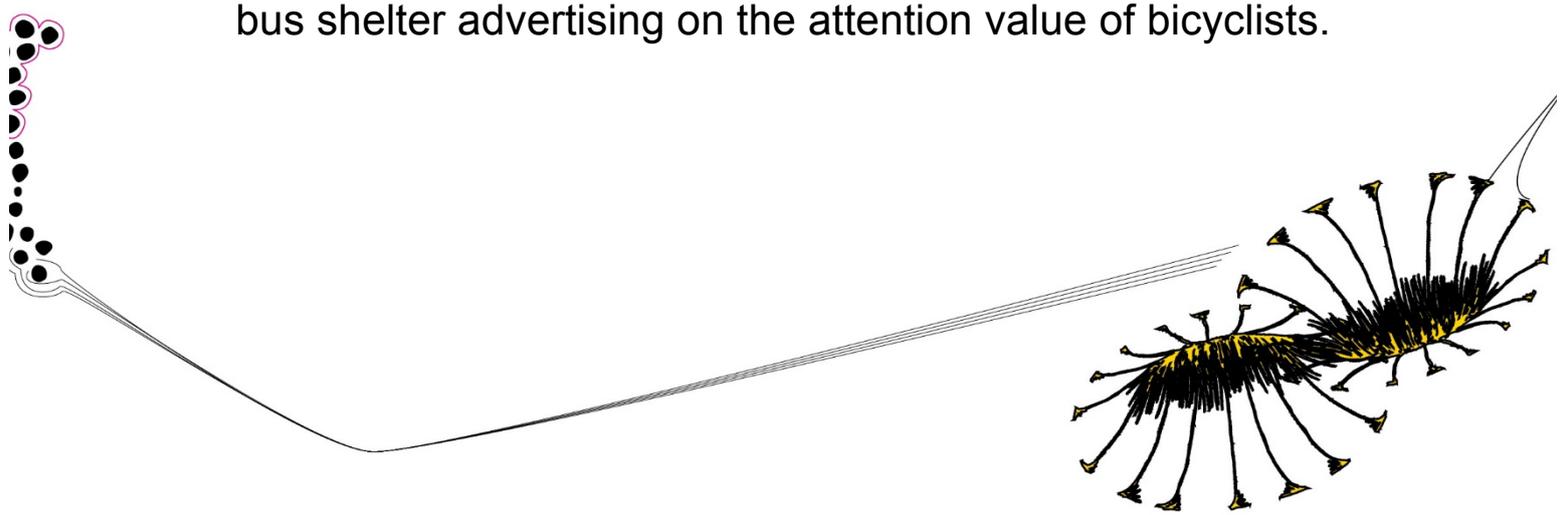


The influence of distraction in traffic, and conspicuousness of bus shelter advertising on the attention value of bicyclists.



Master Thesis

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Abstract

This study investigates the influence of bus shelter advertising and distraction on the attention value of bicyclists in traffic. Attention in traffic is important due to bicyclists' safety. Previous research (Terzano, 2013) concluded that bicyclists who performed additional tasks while bicycling were acting less safe compared to bicyclists who primarily performed their bicycle task. In the current study, the additional task that distracted a bicyclist was listening to music. Besides distraction, advertisements can attract attention from bicyclists; the conspicuousness that attracted attention in the current study was colour. The research was conducted by means of a 2 (distraction: with music versus without music) x 2 (conspicuousness: coloured advertisement versus black and white advertisement) factorial between-subjects experimental design (N = 80). This study measured the implicit recall from the ad, explicit unaided recall from the ad, explicit aided recall from traffic and from the ad, recognition of the ad, and bicyclists' safety ratings. A virtual simulation was used. A route was bicycled and recorded with a GoPro camera. The recorded movie was presented to participants individually with a beamer on a large screen. The recorded movie was shown to 80 participants who were equally divided into four different groups and who had to fill in a questionnaire after watching the movie. Regarding the main research question (*To what extent does the conspicuousness of the bus shelter advertisement and bicyclists' distraction influence bicyclists' attention value in traffic?*), the results showed no significant evidence that distraction has influence on the attention in traffic. However, conspicuousness has an indirect effect on the attention in traffic. The results based on the attention to the ad (unaided and aided explicit recall) showed significant main effects for conspicuousness. The coloured ad was better recalled explicitly than the black and white ad. Finally, the practical implication of this study is that advertisers should keep using coloured ads instead of black and white ads because of advertising effectiveness. However, they have to take the influence of conspicuousness on attention in traffic into account, which is mediated by explicit unaided recall and implicit recall.

Key words: Outdoor advertising, bus shelter advertisement, bicyclists, music, distraction, colour, conspicuousness, traffic attention, implicit recall, explicit recall, and recognition.

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1. Introduction

Outdoor advertising is a common and frequently used advertising medium. According to Floor and Van Raaij (2010), outdoor advertising is a term that contains a collection of different media, which are used in public places, near the road, on stations, and in stadiums. Outdoor advertising can be divided into three categories: poster advertising and transport advertising, neon advertising, and aerial advertising. These categories contain specific types of outdoor advertising, which could be split up into static advertisements, moving advertisements, and event-related advertisements. Bus shelter ads for example, are static and non-event-related advertisements (Floor & Van Raaij, 2010).

Outdoor advertising is a growing advertising medium where the number of formats has grown, so has spending in this medium (Osborne & Coleman, 2008). Radio stations, telecommunication companies, and financial service providers often use outdoor advertising. These companies use the advantage of a large reach, a high level of attention at relatively low costs, the possibility of geographically targeting (Floor & Van Raaij, 2010), 24-hour presence, awareness creation, visual impact from advertisement size (Taylor, Franke, & Bang, 2006), and high levels of exposure (Donthu, Cherian, & Bhargava, 1993).

Hughes and Cole (1986), as mentioned by Crundall, Van Loon, and Underwood (2005), mentioned that drivers do look at and process roadside advertisements. This is the dark side of advertising because the other side of creating brand awareness and drawing attention is the possibility of losing attention in traffic. Among the people who are reached by the ads are cyclists and car drivers. Their primary task is paying attention in traffic instead of paying attention to ads.

According to Osborne and Coleman (2008), who have performed a study about the effectiveness of smartboards (moving advertisements), research regarding to outdoor advertising is still scarce. To get a clear view of the total attention value of bicyclists and the influence of (bus shelter) advertising on traffic attention, this research takes into account distraction in terms of music (wearing earbuds and listening to music while bicycling vs. wearing no earbuds and not listening to music while bicycling), and conspicuousness in terms of colour (coloured advertisement vs. black and white advertisement).

According to a research from Stichting Wetenschappelijk Onderzoek Verkeersveiligheid (2012), which mentioned the studies from Edquist, Horberry, Hosking, and Johnston (2011), and Young, Mahfoud, Stanton, Salmon, Jenkins, and Walker (2009), an outdoor advertisement can distract drivers from the road. Car drivers recall the last ad better compared with the last road sign. It has been concluded that drivers are attending to ads instead of road signs (Young et al., 2009). In other words, an ad distracts from the primary task in traffic. This is positively related to advertising effectiveness but is also related to the dark side of advertising (i.e. negatively related to traffic safety due to a loss of attention). For this study, advertising effectiveness starts with paying attention to ads, and will be measured by the extent of ad recall and recognition (Donthu et al., 1993; Grønhaug, Kvitastein, & Grønmo, 1991). With reference to cyclists, how does attention to outdoor advertising apply to cyclists (who are, and who are not wearing earbuds with music) in terms of the amount of attention that they pay to outdoor advertising?

Moreover in relation to effectiveness of advertising and safety in traffic, it could be important to investigate the implicit and explicit recall of an ad, due to the type of attention that people can pay to an object. Shapiro and Krishnan (2001) have made the distinction between consciously (explicit) and automatic (implicit) memory. Explicit memory is retrieving information that belongs to a specific moment in time (e.g. when a person buys something, thinks back to the ad he has seen, and correctly identifies the brand at the checkout counter as the one that was advertised). However, information can also be remembered based on a prior experience where no conscious attention has been paid to an ad (Shapiro & Krishnan, 2001). A distraction is a decrease of attention based on other stimuli (Gardner, Mitchell, & Russo, 1985). Being distracted might lead to unconscious attention and more implicit recall as opposed to explicit recall because of less cognitive effort. When a person is not distracted he or she might be able to pay conscious attention to an object and to recall information explicitly.

Previous research (Stichting Wetenschappelijk Onderzoek Verkeersveiligheid, 2012) concluded that road users pay attention to outdoor advertising. Due to the vulnerability of bicyclists in traffic, how do they divide their attention to traffic and to advertisements in terms of what they recall? Imagine that you are bicycling: do you notice and remember, whether consciously or not, the advertisements when you pass by or are you paying more attention to the traffic that is passing you by?

Nowadays, 17% of the bicyclists is cycling with music or texting while cycling (Goldenbeld, Houtenbos, Ehlers, & De Waard, 2012). Based on the study from De Waard, Lewis-Evans, Jelijs, Tucha, and Brookhuis (2014), bicyclists with music are experiencing more risk compared to bicyclists without music. Terzano (2013) also concluded that bicyclists who performed additional or secondary tasks were more involved in unsafe situations. Do bicyclists who are listening to music while cycling notice, consciously or unconsciously, a certain outdoor advertisement and how is this related to the attention in traffic? This research focuses on bus shelter advertising as one of the several outdoor advertisement possibilities.

In relation to the attention to an advertisement, previous research (Chan & Fung, 2013; Meyers-Levy & Peracchio, 1995) concluded the importance of colour in advertising. Colour could create conspicuousness of an advertisement in an environment, where it might attract the attention of a bicyclist, which results in less traffic attention. Due to this, the role of colour in advertising could be seen as ambiguous. To illustrate this with an example: A pink advertisement in a wooded area might create a contrast that could attract attention to the advertisement regardless of distraction and subsequent consequences for traffic situations.

This study is of practical relevance because a lot of companies are spending money on these bus shelter advertisements because a lot of people, including bicyclists, are passing by these advertisements. However, paying attention to the advertisement is good in terms of advertising effectiveness but is also part of the dark side of advertising. It is of relevance to take into account the safety of bicyclists in traffic because of the additional tasks that bicyclists perform that may distract them from the main task. Moreover, it is also of relevance to take into account the conspicuousness of an ad because it might attract the attention from traffic to the ad, especially when someone is distracted (Meyers-Levy & Peracchio, 1995). Overall, a bicyclist's primary task in traffic is paying attention in traffic, not to the ad.

The main research question in this study is "*To what extent does the conspicuousness of the bus shelter advertisement and bicyclists' distraction influence bicyclists' attention value in traffic?*" and the three corresponding sub-questions are:

1. Does distraction in terms of music influence a bicyclists' traffic attention?
2. Does bus shelter advertisements conspicuousness in terms of colour influence a bicyclists' traffic attention?
3. When does the attention to a bus shelter ad influence the attention in traffic?

2. Theoretical framework

This study will take into account bicycling while being distracted by music, and the conspicuousness of an advertisement in terms of colour. The theoretical framework provides insights into the literature about attention to outdoor advertising (bus shelter advertisements) and processing an advertisement in traffic, distraction by means of listening to music while bicycling, and the conspicuousness of an advertisement in terms of colour.

2.1 Outdoor advertising

2.1.1 Advertising effectiveness and attention in traffic

Outdoor advertising is also called out-of-home advertising (Osborne & Coleman, 2008) and is an umbrella term of different types of open-air marketing communication activities where the intention of a company can be to make people aware of products and services (Akören, 2015). Ads are interesting for advertising companies (e.g. to create brand awareness) but there is also a dark side of outdoor advertising because it could pull the attention of a road user (i.e. a bicyclist) away from traffic and influence a bicyclist's safety in traffic. Based on the studies from Edquist et al. (2011), and Young et al. (2009), Stichting Wetenschappelijk Onderzoek Verkeersveiligheid (2012) concluded that car drivers are distracted from the road because of outdoor advertisements. For the current study, there will be investigated how this applies to bicyclists.

Outdoor advertising and advertisements in general are somehow eye-catching. Regarding to Osborne and Coleman (2008), there are too little insights into who sees an outdoor advertisement and who can recall the advertisement. However, the facts and figures attest to the importance of outdoor as an advertising medium (Osborne & Coleman, 2008), in the perspective of advertising effectiveness but these facts and figures do not take the dark side of advertising into account. An advertisement can be recalled implicitly and explicitly. Donthu et al. (1993), and Osborne and Coleman (2008) used unaided and aided explicit recall, where Shapiro and Krishnan (2001) concluded in their study, that information also can be remembered based on a prior experience without paying conscious attention to an ad. Shapiro and Krishnan (2001) concluded in their study about implicit and explicit

memory, and complete and divided attention, that a decrease in attention leads to an impeded explicit recall, however, it does not affect the implicit recall.

Osborne and Coleman (2008) performed a study on the effectiveness of outdoor advertising and technological developed smartboards with regard to car drivers. These researchers wanted to gain insights into the effectiveness of more technological developed means of outdoor advertising. Osborne and Coleman (2008) assumed that the use of cell phones and other secondary activities while driving make drivers distracted from the road and from outdoor advertisements, which would lead to less attention to billboards and lower levels of recall. Their findings showed that higher levels of involvement (in their study by means of talking with others about the ads) enhanced the level of recall, and that regular billboards were recalled better than smartboards (Osborne & Coleman, 2008).

Osborne and Coleman (2008) have performed their study with people who have driven a route for one week. The researchers concluded that having passengers in the car and using a cell phone leads to lower recall of advertisements. They also concluded that listening to the radio/music caused higher levels of attention to the advertisements. This was not what they expected. Nevertheless, the higher level of attention to the advertisement did not lead to a higher level of recall (Osborne & Coleman, 2008). However, taken the dark side of advertising into account, it could have been more important to investigate if more attention to the advertisement would have led in turn to less attention in traffic.

Regarding the advertising effectiveness, previous research from Van Meurs and Aristoff (2009) has shown that outdoor advertisements could have several important elements (i.e. image and text, visual elements, amount and size of text, number of elements, use of human characters, product information, new-product information, humour, brand identification, colour, and layout). Van Meurs and Aristoff (2009) also stated that an advertisement could be effective due to the amount of text and the ease of reading the ad. In a study about outdoor advertising and car drivers from Donthu et al. (1993), the amount of text on an advertisement was split up into a few words (five words or less) and many words (ten words or more). Moreover, Bhargava, Donthu, and Caron (1994) concluded in their study that raising the number of words resulted in a lower level of recall.

Donthu et al. (1993) also found that the location of an outdoor advertisement, the position, and the colour may have influence on recalling an advertisement. These

researchers have concluded that advertisements on the right side of the road, black and white advertisements, and advertisements with a few words had a higher extent of recall (i.e. aided and unaided recall). However, there is no research on how this applies to bus shelter advertising, to bicyclists, and to the relation of recalling an advertisement and a bicyclist's traffic attention.

Blasko (1985), as mentioned by Taylor, Franke, and Bang (2006), mentioned that a billboard is effective when a few words (eight or less), a clear presentation of the product/brand, high levels of creativity, simplicity, and clarity with reference to the background of the advertisement are used. Furthermore, Chan and Fung (2013) concluded in their research about subway advertisements that ads with vivid colours draw the attention of people, and they also mentioned the importance of creativity in advertising. These elements are all contributing to more effective advertising but do not take the moral considerations (e.g. traffic safety) into account. Moreover, these elements are part of the dark side of advertising because they make people divide their attention between the ads on the one hand, and traffic on the other hand. Colour in advertisements is one of the important elements in outdoor advertising and will be included for further investigation.

2.1.2 Processing advertisements in traffic

In the existing literature, several researchers (Bhargava et al., 1994; Chan & Fung, 2013; Donthu et al., 1993; Husain & Nizamani, 2011; Van Meurs & Aristoff, 2009) have mentioned that advertisements are drawing attention based on the size, colour, location, and images. Hughes and Cole (1986), as mentioned by Crundall, Van Loon, and Underwood (2005), mentioned that drivers do look at, and process roadside advertisements. This study will investigate if bicyclists also process outdoor advertisements, the influence of advertisements on traffic attention, and the role of conspicuousness and distraction.

With reference to noticing an advertisement, Van Meurs and Aristoff (2009) also mentioned that advertisements in a magazine receive on average one or two seconds of attention. In relation to this, these researchers stated that the duration of noticing an advertisement is the same for outdoor advertisements. Despite the average advertising attention of one or two seconds, advertising is effective in some way. Van Meurs and Aristoff (2009) mentioned that the size of the graphic images in

advertising appear to contribute to a correct association with the brand, based on Rossiter (1981), and that it positively correlates with product recognition, based on Franzen (1994).

Besides the exposure time, outdoor advertising involvement is also an important aspect with reference to attention. Osborne and Coleman (2008) have concluded that high involvement results in a higher level of recall. Involvement regarding an advertisement is split up into intensity and direction. Intention is associated with the attention to an advertisement and with noticing an advertisement, and direction is represented by the type of strategy used to process the information (Gardner et al., 1985). Outdoor advertising involvement has influence on the extent of attention to an ad and recall of an ad (Donthu et al., 1993) on the one hand, but divides a person's attention between the ad and the traffic situation, and might have implications for the primary task while bicycling.

The conspicuousness of colour enhances advertising attention and effectiveness specifically when people are not able and/or motivated (low involvement) to process messages because of distraction (Meyers-Levy & Peracchio, 1995). This is also of relevance for bicyclists because bicyclists are far more vulnerable in traffic as opposed to car drivers (e.g. due to protection). However, to what extent leads ad processing to a decrease of attention in traffic, and what is the role of conspicuousness by means of colour?

2.2 Music as a source of distraction

Outdoor advertisements make drivers distracted (Edquist et al., 2011; Young et al., 2009), however, music makes bicyclists distracted during bicycling also (Terzano, 2013). Making a phone call with a person or listening to music is performed by 17% of all bicyclists (Goldenbeld et al., 2012). On the one hand, music has little influence on how bicyclists behave during cycling (De Waard, Edlinger, & Brookhuis, 2011). On the other hand, music is a distraction (Terzano, 2013) and there is no research that explains what kind of influence distraction during cycling has on the attention to an advertisement, and the relation of the attention to an advertisement on traffic attention. Overall, bicyclists are very vulnerable in traffic. In relation to all traffic accidents among bicyclists, there was used a mobile phone prior to the accident in 3% to 4% of the cases (AD, 2016).

Previous research (Terzano, 2013) concluded that listening to music or a personal music device could make bicyclists more distracted and exhibit less safe behaviour in traffic. The researcher also concluded that bicyclists with a portable music device were involved in unsafe behaviour in 46% of the cases, and bicyclists without the use of music were involved in unsafe behaviour in only 20.8% of the cases. However, Terzano (2013) also stated that it is not possible to know the degree to which a bicyclist is distracted. Moreover, Chan and Fung (2013) also stated that people who are listening to music are distracted. When a person is bicycling with music in his or her ears, he or she might not be aware of processing the advertisement explicitly because being distracted.

Nevertheless, Osborne and Coleman (2008) concluded that car drivers, who listened to music while driving, were paying more attention to billboards. It needs to be addressed that these researchers asked the participants if they have listened to music, without the possibility to control the participants' use of music. The researchers were also not able to control the traffic situation. Due to this, every participant has noticed an advertisement under different conditions. Nevertheless, Osborne and Coleman (2008) did not find a relationship between listening to music and lower (or higher) levels of recall, which they had expected before. For the current study, how is this related to attention in traffic and how does this apply for bicyclists?

According to Gardner et al. (1985), distraction is a decrease of attention based on other stimuli. This was also hypothesised in the study from Osborne and Coleman (2008). Due to Gardner et al. (1985), the aforementioned conclusion from Terzano (2013), the aforementioned statement from Chang and Fung (2013), and the conclusion that dividing attention (in this case to traffic and music) leads to a decrease of attention (Shapiro & Krishnan, 2001), hypotheses 1A, 1B, and 1C are formulated.

- **Hypothesis 1A:** *Bicycling while being distracted (i.e. wearing earbuds and listening to music) negatively influences the attention in traffic as opposed to bicycling while not being distracted.*
- **Hypothesis 1B:** *Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the explicit attention (i.e. lower explicit unaided recall) to the advertisement and in turn on the attention in traffic.*

- **Hypothesis 1C:** *Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the explicit attention (i.e. lower explicit aided recall) to the advertisement and in turn on the attention in traffic.*

Osborne and Coleman (2008) concluded in their study that car drivers, who were listening to music while they drove the car, paid more attention to billboards. However, they could not conclude that there was an increase or decrease in the level of recall while listening to music. In other words, because more attention to an advertisement has not resulted in a higher level of recall, car drivers must have been somewhat distracted. However, according to Shapiro and Krishnan (2001), listening to the radio while driving causes drivers to divide their attention to the road/environment on the one hand, and to the music/radio on the other hand. For this study, the environment includes both the traffic situation and the advertisement.

With reference to conscious and unconscious processing, Veloutsou and O'Donnell (2005), who have performed a study with regard to taxi advertising, mentioned that advertising aims at the conscious and unconscious mind. Noticing an advertisement, consciously or unconsciously, can affect the recognition and recall elements during the evaluation of alternatives when buying products, due to a previous brand exposure (Veloutsou & O'Donnell, 2005).

Shapiro and Krishnan (2001) made the distinction between conscious (explicit) and automatic (implicit) memory. Moreover, people process information based on two systems, the intuitive System 1 and the rational System 2 (Kahneman, 2003). System 1 is related to automatic processing and System 2 is where information is cognitively controlled, based on rational processing. Veloutsou and O'Donnell (2005) argued in their study that people see and read advertisements on taxis but that they do not know when a campaign has started. Due to this, Veloutsou and O'Donnell (2005) mentioned that this finding casts doubt on the extent of the information being consciously analysed or retained, and also that advertising not only aims at the conscious mind.

For this research, the conscious and unconscious recall of an advertisement is important for comparing the attention to the advertisement with the attention in traffic. Unconsciously retaining information in terms of implicit recall will be included to investigate the implicit/automatic influence of an advertisement on bicyclists. Therefore, hypothesis 2 is formulated.

- **Hypothesis 2:** *Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the implicit attention (i.e. higher implicit recall) to the advertisement and in turn on the attention in traffic.*

2.3 Conspicuous by colour

As mentioned before, colour is one of the aspects that attracts attention to an advertisement (Chan & Fung, 2013). With reference to vivid colours, the colour blue in outdoor advertising can be connected to a blue sky and good weather, which can elicit positive feelings and influence the effectiveness of the ad positively. The colour red might have both a positive and a negative influence because of the connection with a stopping sign in a traffic light (Van Meurs & Aristoff, 2009). Van Meurs and Aristoff (2009) have concluded that using blue as dominant colour is more effective than red. However, both colours, blue and red, could be seen as vivid colours. Based on the study from Chan and Fung (2013), vivid colours in outdoor advertisements have a positive influence on the attraction of attention of people. In this study, vivid colours and the corresponding conspicuousness are linked to advertising effectiveness but also to pull attention away from traffic.

With reference to colour in advertising, it is expected that colour also can enhance effectiveness of outdoor advertising (Meyers-Levy & Peracchio, 1995) because it makes an advertisement conspicuous. Chan and Fung (2013), and Van Meurs and Aristoff (2009) mentioned the importance of colour with regard to attention, where Donthu et al. (1993) concluded that black and white advertisements were better recalled. It is expected that black and white advertisements attract more attention when a bicyclist is not distracted, which could have implications for the traffic attention as well.

Meyers-Levy and Peracchio (1995) have concluded that coloured advertisements enhance the level of recall as opposed to black and white advertisements, when people devote few resources to ad processing. However, black and white advertisements as opposed to coloured advertisements are more effective when people expend more resources in processing an ad (Meyers-Levy & Peracchio, 1995). In other words, when people's involvement to process advertisements is low because of being distracted, coloured advertisements are more effective than black and white advertisements. Contradictory to the studies from

Chan and Fung (2013), and Van Meurs and Aristoff (2009), in the study from Donthu et al. (1993) is concluded that black and white advertisements are better recalled than advertisements with vivid colours, regardless of distraction.

Due to the study of Meyers-Levy and Peracchio (1995), Donthu et al. (1993), and the conclusion that bicyclists in traffic are performing less safe when they are distracted (Terzano, 2013), hypotheses 3A, 3B, 3C, and 3D are formulated.

- **Hypothesis 3A:** *A coloured advertisement has an impact on the explicit attention (i.e. higher explicit unaided recall) to the advertisement while being distracted during bicycling (i.e. wearing earbuds and listening to music) and in turn on the attention in traffic.*
- **Hypothesis 3B:** *A coloured advertisement has an impact on the explicit attention (i.e. higher explicit aided recall) to the advertisement while being distracted during bicycling (i.e. wearing earbuds and listening to music) and in turn on the attention in traffic.*
- **Hypothesis 3C:** *A black and white advertisement has an impact on the explicit attention (i.e. higher explicit aided recall) to the advertisement without being distracted during bicycling and in turn on the attention in traffic.*
- **Hypothesis 3D:** *A black and white advertisement has an impact on the explicit attention (i.e. higher explicit unaided recall) to the advertisement without being distracted during bicycling and in turn on the attention in traffic.*

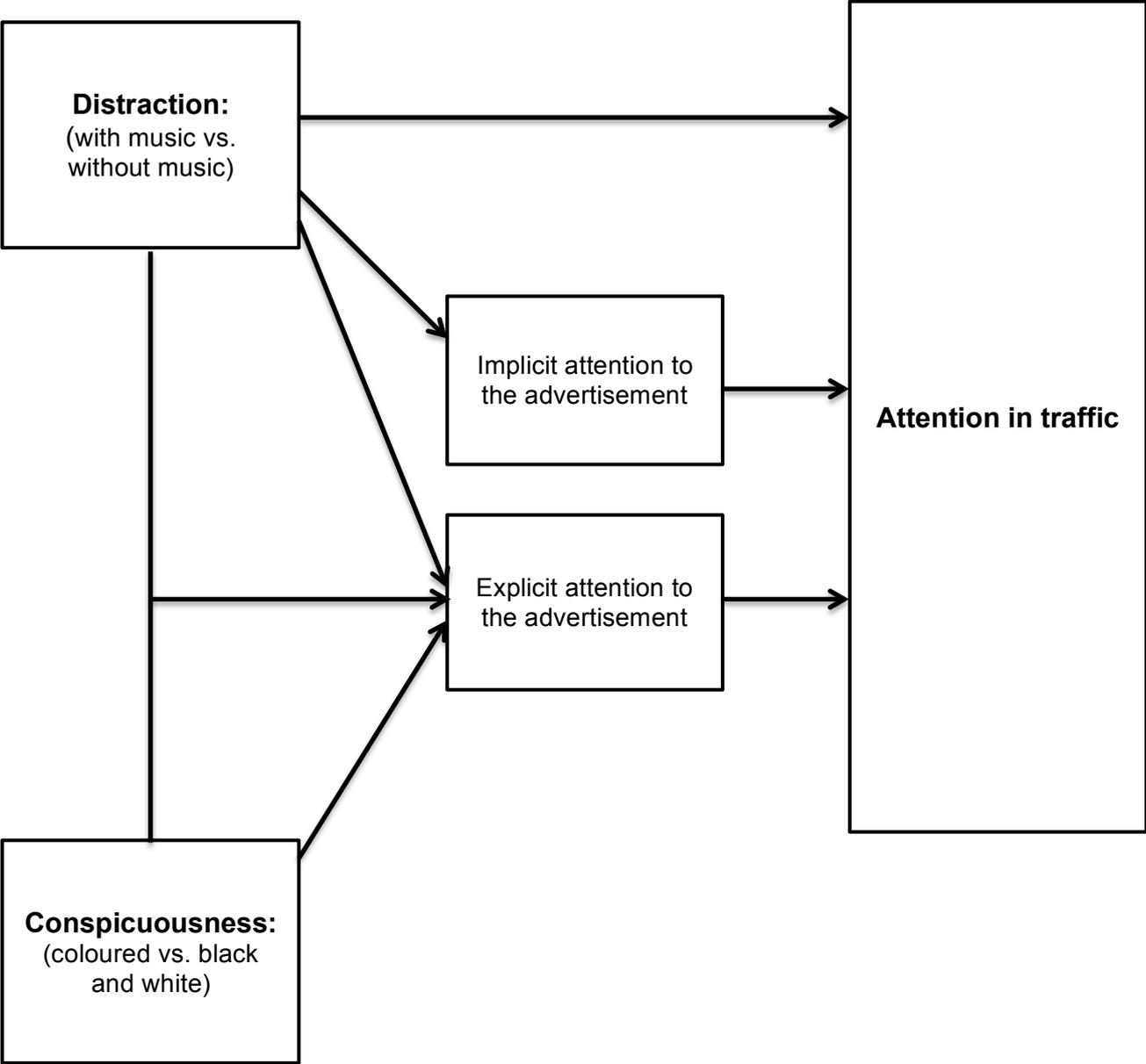
Previous research (Grønhaug et al., 1991) concluded that using several colours has a positive connection to recognizing and reading an advertisement. Van Meurs and Aristoff (2009) concluded in their study that too many colours may create clutter that leads to consumer confusion. Although, for the current study is expected that a lot of colours could result in drawing attention to the advertisement and a decrease of attention in traffic, regardless of the extent of recognizing the brand/company. Therefore, hypothesis 4 is formulated.

- **Hypothesis 4:** *A coloured advertisement as opposed to a black and white advertisement negatively influences the amount of attention in traffic due to the explicit recognition of the advertisement.*

2.4 Overall conceptual model

Based on the theoretical framework the overall conceptual model is presented in Figure 1. It is expected that distraction and conspicuousness together have an indirect effect on traffic attention and a positive effect on explicit attention to the advertisement. This is positively related to advertising effectiveness but also related to the dark side of advertising.

Figure 1
Overall conceptual model



3. Method

3.1 Design

For this study we used a 2 (distraction: with music vs. without music) x 2 (conspicuousness: coloured advertisement vs. black and white advertisement) factorial between-subjects experimental design. In Figure 2, the four conditions are visualized.

Figure 2

All conditions visualized

Condition 1

Colour -
Without music



Condition 2

Colour -
With music



Condition 3

Black and white -
Without music



Condition 4

Black and white -
With music



3.2 Participants

Eighty participants voluntarily participated in this study (N = 80). The participants were randomly selected and assigned to one of the four experimental conditions. Because of a factorial between-subjects experimental design, all participants were equally divided into the four conditions (N = 20).

From the total of 80 participants, there were 43 men and 37 women; 27 completed primary or secondary school, 31 completed their vocational education, 21 completed their Bachelor degree, and 1 participant did not finish any education. The largest group of participants (N = 51) was between 19 and 29 years old. There were

12 participants between 30 and 39 years old, 9 participants were older than 50, 4 participants were between 40 and 49 years old, and 4 participants were 18 years old.

3.3 Procedure

Participants were approached and asked to watch a short movie about a person who was bicycling a route, and afterwards to fill in a short questionnaire (Appendix 1) that was related to the movie. A participant was instructed to watch the movie, to pretend that he or she was the bicyclist in the movie, and to watch the environment and act as if he or she was passing the route. Only participants under the conditions of music watched the movie while a song was being heard by means of earbuds. The movie was shown to individual participants in a room by means of a beamer. By using a beamer, the movie was shown at a large screen to broaden the view of the participant and to increase reality.

When a participant had seen the movie, the participant filled in the questionnaire with items about implicit recall, explicit recall, matched recognition, and safety ratings. The questionnaire was presented in Dutch because the advertisement was in Dutch and the participants were also Dutch. The participants did not know the purpose of the study to avoid social desirable answers.

3.4 Stimulus material

The stimulus material was a short movie about a person who was cycling a route. The movie was recorded by means of a GoPro camera. Only one advertisement was present during the ride and the movie was edited based on the colour of the advertisement with reference to the four conditions as presented in Figure 2 above. An advertisement with a photograph and only a few words that was present on the right side of the road was used to control the ad for effectiveness. The route was similar to the actual route that people took in the studies by Donthu et al. (1993), and Osborne and Coleman (2008). The movie (i.e. virtual simulation) showed a traffic situation in which a bicyclist cycled a route.

The movie was recorded on a quiet moment in terms of traffic because the traffic was manipulated to include traffic attention related items in the questionnaire. All participants have seen and interpreted the advertisement exactly the same, and were confronted with the same traffic situations because of the same route with the

same environmental arousal, noise, and weather, which enhances the comparability of results.

In the conditions with music, the noise in the environment (as recorded during cycling) was turned off to maximize the authenticity of the ride. In the conditions without music, the movie was shown with the real noise that was recorded during the ride. The participants in the conditions with music have heard the number one song (i.e. Mike Posner - I Took A Pill In Ibiza) out of the Dutch Top40 from Radio538 to minimize the chance of not being familiar with the song and to increase the chance of making people somewhat distracted.

3.5 Measures

Based on several other studies (Donthu et al., 1993; Van Meurs & Aristoff, 2009; Osborne & Coleman, 2008) items in the questionnaire were based on explicit and implicit recall, and matched recognition to measure the level of attention that was paid to the advertisement. Explicit recall also measured the attention in traffic. Moreover, attention in traffic was also measured by safety ratings, which was related to the traffic situation. Finally, several demographic elements were included.

Implicit recall

A word completion task was used to measure the implicit memory (Yang, Roskos-Ewoldsen, Dinu, & Arpen, 2006) of the advertisement. Eight unfinished words were used. The first two letters of a word were filled in and a participant had to complete the words (e.g. St____, and Za____). The eight items were coded as 0 or 1 (0 = unrelated to the ad, and 1 = related to the ad). For example, the word "strand" for st____, which is Dutch for beach, was coded as related to the ad and "stoep", which is Dutch for sidewalk, was coded as unrelated to the ad.

Explicit unaided and aided recall

Participants were asked what advertisement they have recalled (i.e. Welke advertentie herinner jij je van de gefietste route?) to measure the unaided recall (Donthu et al., 1993; Osborne & Coleman, 2008). This item was related to the brand/company, and was coded as 0 or 1 (0 = wrong, and 1 = right). For example, "Zoover" was coded as right and "geen" was coded as wrong.

Moreover, participants were also asked to specify the recalled advertisement by mentioning the colour, location, picture, words, and brand/company of the advertisement (i.e. Wat herinner jij je met betrekking tot deze advertentie?). This item was more specifically related to the brand/company, and was coded as 0, 1 or 2 (0 = unrelated, 1 = partially related, and 2 = completely related). For example, "Zoover reisorganisatie. Op de advertentie zie je een vrouw en kind" was coded as completely related, "zonvakantie" was coded as partially related, and "geen" was coded as unrelated.

Aided recall (with help) measured both the attention to the advertisement, and the attention to the traffic situation around the advertisement (Donthu et al., 1993; Osborne & Coleman, 2008). Aided recall to the advertisement (i.e. Heb jij de advertentie van Zoover opgemerkt?) was measured based on a 4-point scale (1 = no, 2 = I don't think so, 3 = I do think so, and 4 = yes).

In relation to the traffic situation around the advertisement, five items with a Cronbach's Alpha of $\alpha = 0.65$ were used to measure the traffic attention. The items were based on the road users who were present in the virtual simulation, and were measured on a 4-point scale (1 = no, 2 = I don't think so, 3 = I do think so, and 4 = yes). For example, "Heb jij de hardloper opgemerkt?" and "Heb jij de witte auto in tegengestelde richting opgemerkt toen je de straat overstak?" were used.

Matched recognition

Matched recognition was used based on the study by Grønhaug et al. (1991), who asked their respondents if they have seen the advertisement. Matched recognition in this study was used by showing the participant pictures of the logo, person, colour, text, and the whole advertisement and rate them on a 4-point scale (e.g. Heb jij deze advertentie gezien?). Five items with a Cronbach's Alpha of $\alpha = 0.77$ were used to measure the matched recognition.

Safety ratings

Traffic attention was also measured by five items about safety ratings, based on a 5-point scale (e.g. Hoe goed was je in staat om op te letten in het verkeer?). Participants filled in a self-report (Waard, van der Hulst, Hoedemaeker, & Brookhuis, 1999) about their safety ratings in the traffic situation around the bus shelter

advertisement. However, to use a reliable safety ratings measurement, three items had to be deleted. The correlation between the two items was 0.71.

Cronbach's Alpha

An overview of the Cronbach's Alpha is presented in Table 1. In this study the Cronbach's Alpha was acceptable for one and sufficient for also one of the two measurements. The Cronbach's Alpha for the traffic attention (explicit aided recall) is 0.65 and is close to 0.70, which is often the boundary of sufficiency and insufficiency. The explicit aided recall (the advertisement) was measured by one item, and two items measured the safety ratings measurement.

Table 1

Overview of Cronbach's Alpha

Measure	Items	Cronbach's Alpha*
Explicit aided recall (traffic safety)	5	0.65
Matched recognition	5	0.77

*Explicit aided recall of the advertisement was measured by one item, and two items measured the safety ratings measurement.

4. Results

The analyses were performed to gain insights into the impact of conspicuousness and distraction during a bicycle ride on a bicyclist's implicit recall, explicit unaided and aided recall, matched recognition, and safety ratings. An overview of all descriptive statistics per condition is presented in Appendix 2, and an overview of the attention in traffic is presented in Appendix 3.

Overview of the differences per condition

Table 2 and Table 3 present an overview of the measurements and differences between the conditions based on distraction and conspicuousness.

Table 2

Overview of the differences between being distracted, and not being distracted

Measurement	<u>Distracted</u>	<u>Not distracted</u>	F	p
	M (SD)	M (SD)		
Implicit recall	1.20 (1.02)	1.08 (1.12)	0.278	0.600
Explicit unaided recall	0.27 (0.64)	0.22 (0.58)	0.154	0.696
Explicit aided recall advertisement	1.57 (1.15)	1.57 (1.08)	0.000	1.000
Explicit aided recall traffic	2.34 (0.82)	2.48 (0.76)	0.678	0.413
Matched recognition	1.48 (0.65)	1.45 (0.67)	0.029	0.865
Safety ratings	3.30 (1.09)	3.68 (0.89)	2.792	0.099

Table 3

Overview of the differences between a coloured ad, and a black and white ad

Measurement	<u>Coloured</u>	<u>Black and white</u>	F	p
	<u>advertisement</u>	<u>advertisement</u>		
	M (SD)	M (SD)		
Implicit recall	0.93 (1.00)	1.35 (1.10)	3.209	0.077
Explicit unaided recall	0.48 (0.78)	0.03 (0.16)	12.462	0.001
Explicit aided recall advertisement	1.98 (1.31)	1.17 (0.68)	11.485	0.001
Explicit aided recall traffic	2.46 (0.86)	2.36 (0.73)	0.355	0.553
Matched recognition	1.59 (0.65)	1.34 (0.65)	2.775	0.100
Safety ratings	3.43 (0.93)	3.55 (1.09)	0.310	0.579

According Table 3, it can be concluded that the differences for conspicuousness on explicit unaided recall, and for conspicuousness on explicit aided recall are significant. Moreover, the differences for conspicuousness on implicit recall are marginally significant.

Attention to the advertisement

A MANOVA analysis was conducted to investigate the effects of distraction (without music vs. with music), and conspicuousness (coloured vs. black and white) on implicit recall, explicit unaided recall of the advertisement, explicit aided recall of the advertisement, and matched recognition.

There was no statistically significant main effect found for distraction on the combined variables, $F(4, 73) = 0.154$, $p = 0.961$; Wilks' $\Lambda = 0.992$. However, there was a statistically significant main effect found for conspicuousness on the combined variables, $F(4, 73) = 4.184$, $p = 0.004$; Wilks' $\Lambda = 0.814$. There was no statistically significant interaction effect for distraction and conspicuousness on the combined variables, $F(4, 73) = 0.486$, $p = 0.746$; Wilks' $\Lambda = 0.974$.

Since there is no main effect found for distraction, the following hypotheses can be rejected:

- Hypothesis 1B:** Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the explicit attention (i.e. lower explicit unaided recall) to the advertisement and in turn on the attention in traffic.
- Hypothesis 1C:** Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the explicit attention (i.e. lower explicit aided recall) to the advertisement and in turn on the attention in traffic.
- Hypothesis 2:** Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the implicit attention (i.e. higher implicit recall) to the advertisement and in turn on the attention in traffic.

Moreover, because no interaction effect was found between conspicuousness and distraction, the following hypotheses can be rejected:

- Hypothesis 3A:** A coloured advertisement has an impact on the explicit attention (i.e. higher explicit unaided recall) to the advertisement while

being distracted during bicycling (i.e. wearing earbuds and listening to music) and in turn on the attention in traffic.

Hypothesis 3B: A coloured advertisement has an impact on the explicit attention (i.e. higher explicit aided recall) to the advertisement while being distracted during bicycling (i.e. wearing earbuds and listening to music) and in turn on the attention in traffic.

Hypothesis 3C: A black and white advertisement has an impact on the explicit attention (i.e. higher explicit aided recall) to the advertisement without being distracted during bicycling and in turn on the attention in traffic.

Hypothesis 3D: A black and white advertisement has an impact on the explicit attention (i.e. higher explicit unaided recall) to the advertisement without being distracted during bicycling and in turn on the attention in traffic.

To explore the significant main effect for conspicuousness on the variables, the MANOVA showed significant main effects for conspicuousness on explicit unaided recall ($F(1, 76) = 12.462, p = 0.001$), and explicit aided recall ($F(1, 76) = 11.485, p = 0.001$). The coloured advertisement was recalled significantly better ($M = 0.48, SD = 0.78$) than the black and white advertisement ($M = 0.03, SD = 0.16$) in terms of explicit unaided recall. In terms of explicit aided recall, the coloured advertisement was recalled significantly better ($M = 1.98, SD = 1.31$) than the black and white advertisement ($M = 1.17, SD = 0.68$). Furthermore, the results showed a marginally significant main effect for conspicuousness on implicit recall ($F(1, 76) = 3.209, p = 0.077$). The black and white advertisement was recalled significantly better ($M = 1.35, SD = 1.10$) than the coloured advertisement ($M = 0.93, SD = 1.00$) in terms of implicit recall.

Finally, since there is no significant effect for conspicuousness on matched recognition, the following hypothesis can be rejected:

Hypothesis 4: A coloured advertisement as opposed to a black and white advertisement negatively influences the amount of attention in traffic due to the explicit recognition of the advertisement.

Attention in traffic

A MANOVA analysis was conducted to investigate the effects of distraction (without music vs. with music), and conspicuousness (coloured vs. black and white) on aided recall to traffic, and safety ratings.

There was no statistically significant main effect found for distraction on the combined variables, $F(2, 75) = 1.631, p = 0.203$; Wilks' $\Lambda = 0.958$. There was also no statistically significant main effect found for conspicuousness on the combined variables, $F(2, 75) = 0.351, p = 0.705$; Wilks' $\Lambda = 0.991$. There was no statistically significant interaction effect found for distraction and conspicuousness on the combined variables, $F(2, 75) = 1.417, p = 0.249$; Wilks' $\Lambda = 0.964$.

Since there is no significant main effect for distraction, the following hypothesis can be rejected:

Hypothesis 1A: Bicycling while being distracted (i.e. wearing earbuds and listening to music) negatively influences the attention in traffic as opposed to bicycling while not being distracted.

Mediation regression analyses

Due to the fact that no significant effects for distraction on explicit and implicit recall were found, the expected mediation effect did not occur. For this reason, the variable distraction is left out for further mediation regression analyses. On the other hand, because the MANOVA showed main effects for conspicuousness on implicit recall, explicit unaided recall, and explicit aided recall, mediation regression analyses were performed. These analyses were performed to investigate if conspicuousness influenced attention in traffic with explicit recall and/or implicit recall as mediators.

Table 4

Overview of the variable conspicuousness predicting explicit unaided recall, explicit aided recall, and implicit recall

Predictor	Explicit unaided recall		Explicit aided recall		Implicit recall	
	β	t	β	t	β	t
Conspicuousness	- 0.45*	- 3.56	- 0.80	- 3.43	0.43**	1.81

* $p < 0.05$, ** $p < 0.10$

Table 5

Overview of the mediation regression analyses

Predictors	Attention in traffic			
	Aided recall		Safety ratings	
	β	t	β	t
Conspicuousness	-0.11	-0.59	0.13	0.55
Explicit unaided recall	-0.28 **	-1.76	-0.09	-0.42
Explicit aided recall	-0.09	-0.99	-0.05	-0.05
Implicit recall	-0.15**	-1.82	0.04	0.33

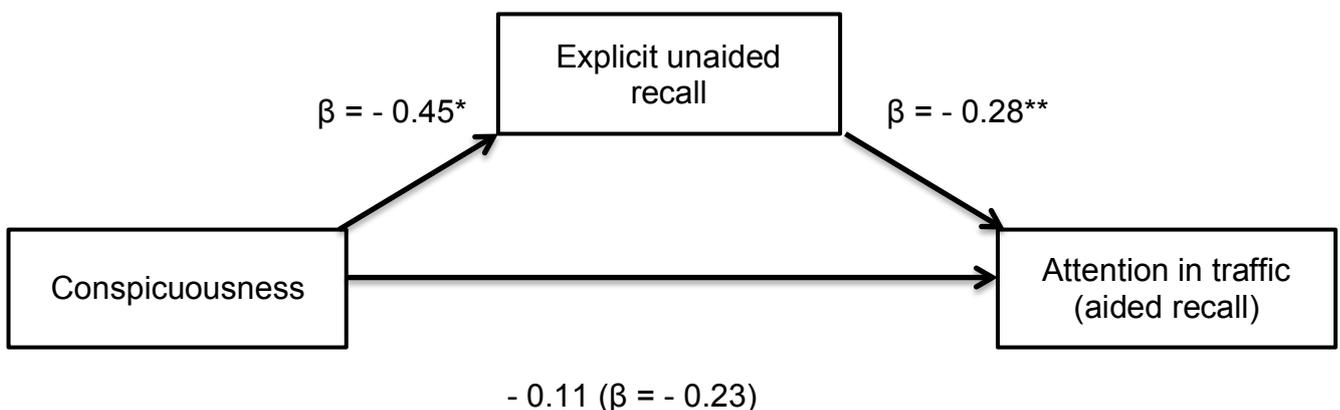
*p < 0.05, **p < 0.10

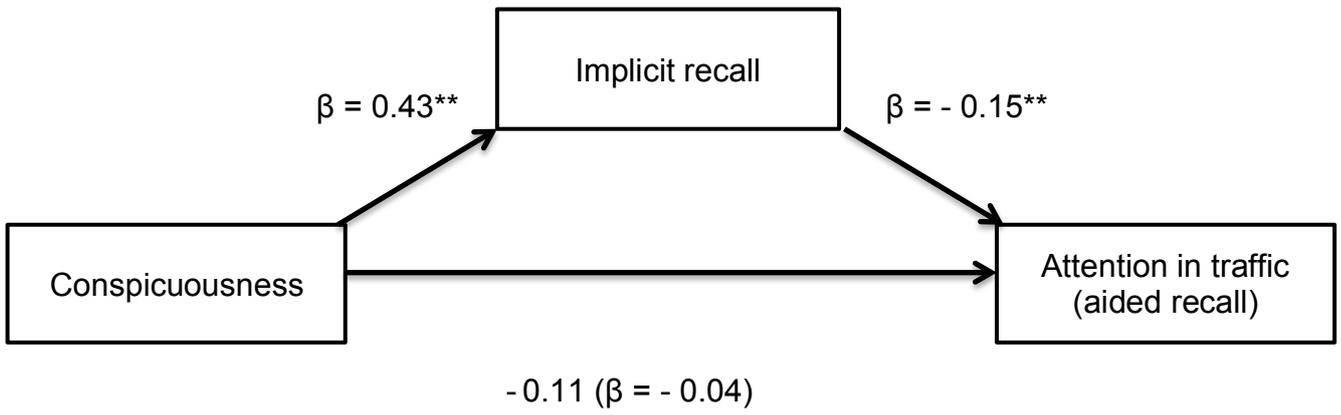
According to Table 4 and Table 5, no significant effect of explicit aided recall was found and due to this, it was left out of further analyses. There was no significant effect of conspicuousness on attention in traffic directly, nor as measured by aided recall nor by safety ratings. However, there were found two mediation effects. First, conspicuousness had a significant effect on explicit unaided recall, which in turn had a marginally significant effect on attention in traffic. Thus, explicit unaided recall functions as a mediator between conspicuousness and attention in traffic.

Second, conspicuousness had a marginally significant effect on implicit recall, which in turn had a marginally significant effect on attention in traffic. Thus, implicit recall functions as a mediator between conspicuousness and attention in traffic. Overall, implicit recall functions as a mediator but is having a weak influence on attention in traffic, considering the fact that the effects are low.

Figure 3

Results of mediation analyses for variables predicting the attention in traffic





* $p < 0.05$, ** $p < 0.10$

5. Conclusions

In the current study, the main goal was to give an answer on the main research question and three sub-questions. First, it needs to be addressed that distraction did not significantly influence the attention in traffic. However, conspicuousness has an indirect effect on the attention in traffic, due to explicit unaided recall, and implicit recall as mediators. Furthermore, a black and white ad was better recalled implicitly compared to a coloured ad. However, a coloured advertisement was better recalled explicitly compared to a black and white advertisement. The results of the MANOVA for attention to the advertisement showed significant main effects for conspicuousness on explicit unaided recall, and for conspicuousness on explicit aided recall. Besides these two significant main effects, a marginal significant main effect was found. The black and white advertisement was better recalled implicitly than the coloured advertisement.

Due to fewer colours in a black and white ad, people might process fewer stimuli. Fewer stimuli could make people process the specific parts on the advertisement better (e.g. the family, beach). When there are more colours on the advertisement, people might process more stimuli because of the vividness of the colours, and might see more a whole ad instead of separate components that stay in a person's mind. In other words, the total ad becomes eye-catching, without noticing and remembering the exact parts of the ad.

Moreover, there is a marginally significant effect of implicit recall as a mediator between conspicuousness on attention in traffic. An explanation might be that bicyclists kept thinking about the parts of the black and white ad, without being aware of this thinking. On the other hand, there is a significant effect of explicit unaided recall as a mediator between conspicuousness and attention in traffic. This effect might be explained by a shift of attention from traffic to the advertisement. However, the mediation effects are marginally significant and due to this, it must be interpreted carefully.

Regarding to the main research question and sub-questions, there can be concluded that distraction in terms of music does not influence a bicyclists' traffic attention. On the other hand, the bus shelter advertisements' conspicuousness in

terms of colour does influence a bicyclists' traffic attention with explicit unaided recall, and implicit recall as marginally significant mediators.

Figure 4

Overview of supported (✓) and rejected (X) hypotheses

H1A: Bicycling while being distracted (i.e. wearing earbuds and listening to music) negatively influences the attention in traffic as opposed to bicycling while not being distracted.	X
H1B: Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the explicit attention (i.e. lower explicit unaided recall) to the advertisement and in turn on the attention in traffic.	X
H1C: Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the explicit attention (i.e. lower explicit aided recall) to the advertisement and in turn on the attention in traffic.	X
H2: Being distracted while bicycling (i.e. wearing earbuds and listening to music) has an impact on the implicit attention (i.e. higher implicit recall) to the advertisement and in turn on the attention in traffic.	X
H3A: A coloured advertisement has an impact on the explicit attention (i.e. higher explicit unaided recall) to the advertisement while being distracted during bicycling (i.e. wearing earbuds and listening to music) and in turn on the attention in traffic.	X
H3B: A coloured advertisement has an impact on the explicit attention (i.e. higher explicit aided recall) to the advertisement while being distracted during bicycling (i.e. wearing earbuds and listening to music) and in turn on the attention in traffic.	X
H3C: A black and white advertisement has an impact on the explicit attention (i.e. higher explicit aided recall) to the advertisement without being distracted during bicycling and in turn on the attention in traffic	X
H3D: A black and white advertisement has an impact on the explicit attention (i.e. higher explicit unaided recall) to the advertisement without being distracted during bicycling and in turn on the attention in traffic.	X
H4: A coloured advertisement as opposed to a black and white advertisement negatively influences the amount of attention in traffic due to the explicit recognition of the advertisement.	X

6. Discussion

The main focus of this study was to provide insights into the role of distraction in traffic, and the influence of bus shelter advertisements on a bicyclist's traffic attention. A virtual simulation was used to measure the implicit recall, explicit recall, recognition, and safety ratings of participants. The results showed no main effects for distraction and conspicuousness in relation to traffic attention. However, two main effects were found for conspicuousness in relation to explicit attention to the advertisement. A marginal significant main effect was found for conspicuousness on implicit recall. Moreover, two mediators were found between conspicuousness and attention in traffic.

6.1 Findings and theoretical implications

In the current study, there were some consistent and inconsistent findings with the existing literature. First, as mentioned by Gardner et al. (1985), a distraction leads to a decrease of attention. The results in this study showed no significant effect for distraction on traffic attention as measured by aided recall, nor as measured by safety ratings. There were also no significant effects for distraction with reference to attention to the advertisement. The results indicate that distraction does not influence the attention in traffic, or attention to the advertisement, and are inconsistent with the research from Gardner et al. (1985). However, it is worth mentioning that the statement from Gardner et al. (1985) did not include bicyclists, and outdoor advertising specifically. This might indicate that the attention to outdoor ads differs from the attention to other print ads while being distracted.

Second, in relation to traffic attention, there were no significant effects for distraction and conspicuousness together. Because of no significant main effect for distraction, or interaction effect for distraction and conspicuousness on attention in traffic, it cannot be concluded that being distracted by means of music has influence on a bicyclist's traffic safety. This could mean that it does not matter for a person's safety if he or she is cycling with or without music. This conclusion needs to be interpreted carefully due to the fact that Terzano (2013) concluded that bicyclists who performed additional tasks while bicycling were acting less safe, and due to the type

of research in the current study. The current study was not performed in a real-life setting.

As addressed earlier in this study, outdoor advertising is a way of communication where companies may have the intention to make people aware of products and services (Akören, 2015). In traffic, the primary task of a road user is to pay attention and to travel safe. With this in mind, there is also a dark side of outdoor advertising because advertising can attract attention from traffic to the advertisement, what could be dangerous for bicyclists in traffic. Another finding in the current study is that there were two marginally significant mediators between conspicuousness and attention in traffic. These mediators were implicit recall, and explicit unaided recall. Overall, the level of recalling the advertisement was quite low, what might indicate that bicyclists do not pay a lot of attention to an advertisement while bicycling. Due to this, there is a dark side of advertising, however it is limited in this context.

Consistent with the existing literature is that coloured advertisements are more effective as opposed to black and white advertisements when people devote few resources to ad processing, as stated by Meyers-Levy and Peracchio (1995). However, coloured ads are also more effective when bicyclists are distracted, which is inconsistent with the study from Meyers-Levy and Peracchio (1995). The attention, as measured by explicit aided recall, to the coloured advertisement was higher than the attention to the black and white advertisement. This does also apply for explicit unaided recall; the attention to the coloured ad was higher as opposed to the black and white ad. However, it needs to be addressed that the attention to the advertisement in total was quite low. Due to the differences between colour, and black and white, these findings possibly indicate that bicyclists' attention was drawn to the vivid colours of the advertisement.

With reference to conspicuousness, black and white ads were better recalled compared to coloured ads in terms of implicit recall. Nevertheless, this was the opposite for explicit recall as mentioned before. The coloured ad was getting significantly more attention compared to the black and white ad. In other words, explicit aided recall was better for the coloured ad compared to the black and white ad. This is consistent with previous studies from Chan and Fung (2013), and Van Meurs and Aristoff (2009), and inconsistent with the study from Donthu et al. (1993). The results might indicate that a black and white advertisement was more seen unconsciously but also more in separate parts, due to experiencing fewer stimuli as a

result of fewer colours. It might also indicate that the vivid colours of an advertisement were drawing more explicit attention to bicyclists, who might have noticed a whole ad instead of separate parts, due to experiencing more stimuli.

The finding of the current study, which showed that coloured ads as opposed to black and white ads were better recalled in terms of explicit recall, was regardless of distraction. Donthu et al. (1993) concluded that black and white ads were better recalled as opposed to coloured ads regardless of distraction, because distraction was not included in their study. Moreover, under certain conditions, advertisers may realize double benefits by employing black and white ads rather than coloured ads and simultaneously achieve enhanced ad effectiveness (Meyers-Levy & Peracchio, 1995). On the contrary, Meyers-Levy and Peracchio (1995) also concluded that colour is more effective in other conditions (e.g. when consumers devote few resources to ad processing because they simply are unmotivated). In relation to traffic safety, these findings could be linked to the dark side of advertising.

Donthu et al. (1993) mentioned the possibility that black and white ads were recalled better than coloured ads as most outdoor ads are coloured and the relatively few black and white ads stood out and drew respondent attention. This was not the case in the current study where both colour, and black and white were used in an equal amount of conditions. The black and white ad has not shown more recall, so it is possible that explicit recall for coloured ads is higher because of the vividness of the colours as opposed to the reasoning of Donthu et al. (1993). According to Meyers-Levy and Peracchio (1993), black and white ads are more effective when consumers are motivated to expend heavy resources processing an ad that is extremely resource demanding, and insufficient resources remain to engage adequately in ad claim substantiation. In the current study, there were no significant differences in the level of recall for distracted and not distracted bicyclists. It is possible that vivid colours are conspicuous to such an extent that it makes no difference between being distracted and not being distracted. Based on the current study and the studies from Donthu et al. (1993) and Meyers-Levy and Peracchio (1993) there is no consistent conclusion with reference to the conspicuousness of colour, however, the current study showed a weak influence on the traffic attention of a bicyclist (i.e. a weak relation to the dark side of advertising).

Finally, the coloured ad was not significantly more recognized compared to the black and white ad. These results are inconsistent with the study from Grønhaug et

al. (1991), who have mentioned that using several colours has a positive connection to recognizing and reading an ad. More importantly, it does not hamper attention in traffic.

6.2 Limitations

In the present study several aspects are clarified with regard to bicyclists in traffic. However, there are some limitations that should be addressed for future research. One of these limitations is the music that has been used to distract the bicyclists. To have equal conditions, all participants who were assigned to a condition with music had to listen to the same song. Participants might have not liked the song and could have been less distracted than when they would have listened to a song of their own choice.

One other limitation in the current study is the use of a manipulated black and white advertisement. The original bus shelter advertisement from Zoover was coloured. For this study the exact same advertisement was edited black and white to have equal comparisons, however Zoover might possibly have designed this advertisement specifically based on the fact that this advertisement would be published in colour. The same message on an ad might have been communicated quite different when using a black and white advertisement. This might have had influence on the extent of recalling the black and white ad because an originally developed black and white ad might have been more effective.

With regard to the traffic attention as measured by aided recall, a reduction from ten till five items was needed because of a reliable Cronbach's Alpha. Each item was related to a different road user in the specific traffic situation. Using ten items (i.e. ten road users) would have given a better insight into the total attention in traffic because there were actually more than five road users to notice. Besides this, when analysing the data of explicit unaided recall, and aided recall, the homogeneity of variance assumption was violated and the analysis is robust to violations of homogeneity of variances, so there is a risk that the output of these measurements will not be completely accurate.

With reference to the reliability of the items in the questionnaire, the aided recall items in the questionnaire measured a respondent's attention in traffic, and attention to the advertisement. However, it needs to be mentioned that these items

are sensitive for social desirability, and do measure the attention of a respondent perceptually. Moreover, the name Zoover was already mentioned in the questionnaire before the respondent had to start with the matched recognition part. Due to this, respondents might have answered quite easily that they had seen the advertisement or an element of the ad. These items might also be sensitive for social desirability.

6.3 Future research

It would be interesting for future research to include the traffic attention while bicycling in the dark, the effect of enlightened bus shelters, and 3D aspects in bus shelters. Furthermore, it might be interesting to test nudity in advertisements in relation to traffic attention. Not regarding to recall and recognition but to what extent it pulls the attention away from traffic. These aspects might be included for future research because it could give insights into the aspects of a bus shelter ad that could influence a cyclist's traffic attention.

Related to outdoor advertising, Osborne and Coleman (2008) have performed an associated study and have put their focus on rotating and moving advertisements. This current study has focused on a bus shelter ad but it would be interesting also to test the traffic attention when bicyclists are exposed to other types of outdoor advertising like A0 boards on lampposts. Including other types of outdoor advertising might give insights into the aspects of outdoor advertising that could have influence on the traffic attention of a bicyclist.

Furthermore, it would be interesting to test the implicit recall by using an advertisement with a certain product type (e.g. soda) and test the implicit recall by asking what kind of drink the bicyclist prefers after travelling the route. This could be interesting because it provides insights into the effectiveness of advertising in terms of creating a preference among consumers.

Moreover, distraction can be realised by other manipulations like using a cell phone or cycling with a fellow traveller. This would also be interesting for future research because it gives a complete insight into the role of distraction in traffic. This could be combined with a real-life study where participants will be observed for their safe or unsafe behaviour to compare with the type of distraction.

It might be interesting for future research to investigate if the significant effects of conspicuousness on explicit unaided recall, and implicit recall in turn influences the traffic safety of a bicyclist in other situations, due to the different traffic situations people have to deal with in daily life. With regard to the number of participants, due to some reasons there was only used a relatively small amount of bicyclists (N = 80). By increasing the amount of bicyclists, there could be reached an increase of significance and generalization.

6.4 Practical implications

The practical implications of the results of this study are on the boundary of ethics when taking the effectiveness of advertising into account. Advertising is effective in terms of paying explicit attention to coloured ads, regardless of distraction. The attention to an ad hampers the traffic attention, however only weakly, due to the marginally significant mediators. Outdoor advertising can be related to the dark side of advertising when taking a bicyclist's safety into account, however, the findings of this study showed that attention to the advertisement does hamper the traffic attention of a bicyclist minimally.

With regard to safety, the assumptions of a negative influence on the attention in traffic due to the conspicuousness of an ad, and the level of distraction of a bicyclist were rejected because of no significance. However, when taking a bicyclist's safety into account, the current presentation of a bus shelter advertisement has little influence on the attention in traffic. Despite the extent of influence, it cannot be denied that it has influence on the attention in traffic. Thus, it has a negative influence on a bicyclist's traffic safety. Moreover, it is on the boundary of ethics when concluding that the current presentations should not have to change because the primary task of a bicyclist will not be hampered that much.

Due to different types of processing, advertisers might use several elements in outdoor advertising to enhance the implicit recall or explicit recall. To reach road users effectively, black and white advertisements could be used to influence the implicit recall. On the other hand, advertisers should use coloured ads to enhance the explicit recall and to influence road users effectively on a conscious level. It needs to be mentioned that the attention to the advertisement influences the traffic attention, thus influences the traffic safety.

Finally, when taking the effectiveness of an advertisement into account for the target group bicyclists, advertisers might reconsider to change the way of designing their bus shelter advertisement because it was recalled only a few times. Besides this, if advertisers want specifically bicyclists to attend on a certain topic with bus shelter ads, they might consider using other outdoor advertisement possibilities for having more success. Again, this might fit the dark side of advertising.

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Appendices

Appendix 1: Questionnaire

Allereerst wil ik je hartelijk bedanken voor je deelname in het onderzoek.

Je hebt zojuist een filmpje gezien over een persoon (jij in dit geval), die een route fietste. Over het getoonde filmpje wil ik je graag enkele vragen stellen.

De vragenlijst is gebaseerd op het filmpje en bevat vragen voor een onderzoek op het gebied van buitenreclame en verkeerssituaties. De vragenlijst neemt slechts 5 minuten van je tijd in beslag en is volkomen anoniem.

A. Word completion task

Maak de onderstaande woorden af.

Zo _____

Ge _____

St _____

Za _____

Va _____

Wa _____

Fa _____

Be _____

B. Explicit unaided recall

B.1. Welke advertentie herinner jij je van de gefietste route?

Openvraag antwoord.

B.2. Wat herinner jij je met betrekking tot deze advertentie?

Advertentie	Wat is herinnerd?
Naam organisatie/merk:	

C. Explicit aided recall (omtrent de advertentie)

Beantwoord de volgende vragen met betrekking het waarnemen van de genoemde advertentie en de verkeerssituatie.

Heb jij de advertentie van Zoover opgemerkt?

Nee	Ik denk het niet	Ik denk het wel	Ja

(Omtrent de verkeerssituatie)

Heb jij de hardloper opgemerkt?
Heb jij de fietser die jou inhaalde opgemerkt?
Heb jij de fietser met fietstassen opgemerkt?
Heb jij de zwarte auto die de straat links insloeg opgemerkt?
Heb jij de grijze auto die de straat links insloeg opgemerkt?
Heb jij de fietser in tegengestelde richting opgemerkt toen je de straat overstak?
Heb jij de witte auto in tegengestelde richting opgemerkt toen je de straat overstak?
Heb jij de grijze auto in tegengestelde richting opgemerkt toen je de straat overstak?
Heb jij al wachtend de voorbijrijdende donkere auto opgemerkt?
Heb jij al wachtend de voorbijrijdende eerste grijze auto opgemerkt?
Heb jij al wachtend de voorbijrijdende tweede grijze auto opgemerkt?

Nee	Ik denk het niet	Ik denk het wel	Ja

D. Matched recognition

Beantwoord de volgende vragen met betrekking tot de advertentie.

	Afbeelding van de advertentie
Heb jij dit logo gezien in de advertentie?	
Heb jij deze kleur in de advertentie gezien?	

Nee	Ik denk het niet	Ik denk het wel	Ja

Heb jij deze persoon gezien in de advertentie?	
Heb jij deze tekst in de advertentie gezien?	
Heb jij deze advertentie gezien?	

E. Zelfrapportage omtrent verkeerssituatie

Beantwoord de volgende vragen omtrent jouw ervaring met betrekking tot de verkeerssituatie rondom de advertentie op basis van een schaal van 1 tot en met 5.

Hoe ervaar je het risicogehalte van de situatie?
In hoeverre acht jij jezelf in staat om bekwaam te reageren op de situatie?
Hoe goed was je in staat om op te letten in het verkeer?
Hoe beoordeel jij de moeilijkheidsgraad van de verkeerssituatie?
Hoe goed was jij in staat om alles in de omgeving waar te nemen?

1	2	3	4	5
Laag				Hoog
Onbekwaam				Bekwaam
Slecht				Goed
Gemakkelijk				Moeilijk
Slecht				Goed

F. Attitude ten opzichte van de advertentie

Beantwoord de volgende items gebaseerd op een schaal van 1 tot en met 7.

"Ik vond de advertentie ..."

Goed
Leuk
Interessant
Aantrekkelijk
Aangenaam

1	2	3	4	5	6	7

Slecht
Niet leuk
Saaï
Onaantrekkelijk
Onaangenaam

G. Demografische aspecten

Geslacht

Man	Vrouw

Leeftijd

jaar

Hoogst afgeronde opleidingsniveau:

1 = Middelbaar
of lager
onderwijs

2 = MBO

3 = HBO

4 = WO

5 = Geen

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Appendix 2: Overview of the recall and recognition for all four conditions

Table 6

Recall and recognition per condition and in total

	Measure	N	M	SD
All participants	Implicit recall	80	1.14	1.06
	Explicit unaided brand recall	80	0.09	0.28
	Explicit unaided total recall	80	0.25	0.61
	Explicit aided recall traffic	80	2.41	0.79
	Explicit aided recall advertisement	80	1.58	1.11
	Matched recognition	80	1.46	0.66
	Safety ratings	80	3.49	1.01
Condition 1	Implicit recall	20	0.85	1.04
	Explicit unaided brand recall	20	0.10	0.31
	Explicit unaided total recall	20	0.40	0.75
	Explicit aided recall traffic	20	2.67	0.80
	Explicit aided recall advertisement	20	2.00	1.26
	Matched recognition	20	1.55	0.67
	Safety ratings	20	3.55	0.65
Condition 2	Implicit recall	20	1.00	0.97
	Explicit unaided brand recall	20	0.20	0.41
	Explicit unaided total recall	20	0.55	0.83
	Explicit aided recall traffic	20	2.25	0.87
	Explicit aided recall advertisement	20	1.95	1.40
	Matched recognition	20	1.62	0.65
	Safety ratings	20	3.30	1.15

Condition 3	Implicit recall	20	1.30	1.17
	Explicit unaided brand recall	20	0.05	0.22
	Explicit unaided total recall	20	0.05	0.22
	Explicit aided recall traffic	20	2.29	0.68
	Explicit aided recall advertisement	20	1.15	0.67
	Matched recognition	20	1.35	0.68
	Safety ratings	20	3.80	1.08
Condition 4	Implicit recall	20	1.40	1.05
	Explicit unaided brand recall	20	0	0
	Explicit unaided total recall	20	0	0
	Explicit aided recall traffic	20	2.42	0.78
	Explicit aided recall advertisement	20	1.20	0.70
	Matched recognition	20	1.33	0.63
	Safety ratings	20	3.30	1.06

Appendix 3: Overview of the attention in traffic

Table 7

Overview of the average attention in traffic from all participants ($N = 80$)

Items in Dutch	M	SD
A. Heb jij de hardloper opgemerkt?	3.14	1.29
B. Heb jij de fietser die jou inhaalde opgemerkt?	3.93	0.47
C. Heb jij de fietser met fietstassen opgemerkt?	2.44	1.24
D. Heb jij de zwarte auto die de straat links insloeg opgemerkt?	2.31	1.20
E. Heb jij de grijze auto die de straat links insloeg opgemerkt?	2.23	1.25
F. Heb jij de witte auto in tegengestelde richting opgemerkt toen je de straat overstak?	2.32	1.31
G. Heb jij de grijze auto in tegengestelde richting opgemerkt toen je de straat overstak?	2.18	1.20
H. Heb jij al wachtend de voorbijrijdende donkere auto opgemerkt?	2.46	1.28
I. Heb jij al wachtend de voorbijrijdende eerste grijze auto opgemerkt?	2.46	1.25
J. Heb jij al wachtend de voorbijrijdende tweede grijze auto opgemerkt?	1.94	1.05