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Attention, memory and preference for direct and indirect print advertisements

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Abstract

We examined the effectiveness of direct and indirect advertising. Direct ads openly depict advertised products and brands. In indirect ads, the ad message requires elaboration. Eye movements were recorded while consumers viewed direct and indirect advertisements under fixed (5 seconds) or unlimited exposure time. Recognition of ads, brand logos and preference for brands were tested under two different delays (after 24 hours or 45 minutes) from the ad exposure. The total viewing time was longer for the indirect ads when exposure time was unlimited. Overall, ad pictorials received more fixations and the brand preference was higher in the indirect condition. Recognition improved for brand logos of indirect ads when tested after the shorter delay. Consumers experienced indirect ads as more original, surprising, intellectually challenging and harder to interpret than direct ads. Current results indicate that indirect ads elicit cognitive elaboration that translates into higher preference and memorability for brands.

Attention, memory and preference for direct and indirect print advertisements

1. Introduction

Advertisers use various strategies to capture and hold consumers' attention in competitive visual environments. One communication strategy is to increase ad originality (Pieters, Warlop, & Wedel, 2002) by creating ads that are difficult to interpret and do not guide consumers to a specific interpretation. Several terms have been used to refer to ads that do not instantly convey what they promote: mystery (Elsen, Pieters, & Wedel, 2016), indirect (McQuarrie & Phillips, 2005), open (Ketelaar, Van Gisbergen, & Beentjes, 2012; Ketelaar, Van Gisbergen, Bosman, & Beentjes, 2008), or implicit (Radach, Lemmer, Vorstius, Heller, & Radach, 2003; van Mulken, van Enschot, & Hoeken, 2005). These ads present the relationship between the ad elements in a creative and indirect manner contrary to ads that show the elements in direct relation to the product being advertised (Higgins, Leinenger, & Rayner, 2014).

Creativity or originality in advertising involves divergence and relevance, that is, creative ads must contain elements that are novel, different or unusual, but in order to be effective, they also must be meaningful, appropriate or valuable to the audience (reviewed in Smith & Yang, 2004). A typical example of an indirect claim in advertisements is a metaphor that makes figurative rather than literal claims and implies the message without stating it outright (McQuarrie & Phillips, 2005). In particular, visual metaphors have become common along with the trend of images gaining more emphasis and space in print advertisements (McQuarrie & Phillips, 2008). Visual metaphors can be characterized as implicit argumentation that lead into increased cognitive elaboration, and due to these properties, visual metaphors were found to be more persuasive than their verbal counterparts (Jeong, 2008). However, no specific creative technique or feature can be uniquely associated with originality or creativity (see Pieters et al., 2002). According to a general definition, original ads deviate from the norm, are atypical for the product or brand, and are experienced as unique and different from other ads (Elsen et al., 2016; Pieters et al., 2002). For reasons of simplicity, we use the terms *direct* and *indirect* to describe ads that do or do not convey their message immediately.

The promoted product and brand form the basic identity of an ad. An ad's identity is functional for consumers because it helps them to assess whether it is personally relevant and whether

more attention is required to process its message (Elsen et al., 2016). Ads convey their basic identity in different ways. The benefit of indirect ads is that when there is little guidance toward a certain interpretation, consumers need to integrate both visual and verbal information from different locations of the ad to determine its content (Wyer, Hung, & Jiang, 2008). In addition, the openness of indirect claims makes consumers receptive to multiple, distinct and positive inferences about the advertised brand (McQuarrie & Phillips, 2005). However, the benefits of indirect advertising may be compromised. As proposed before (Pieters et al., 2002), the positive and entertaining qualities of indirect ads may bias attention to the pictorial and textual elements resulting in reduced viewing of the advertised brand. As a result, memory for the pictorial elements may improve but memory for the brand may decrease.

In two experiments, we investigated here the influence of ad type (direct versus indirect) on consumers' eye movements to the key elements of advertisements –the pictorial, brand, product, and text. We also asked whether ad type and attention, in terms of increased number of eye fixations, influence memory for the pictorials and brands. In Experiment 2, participants also rated the ads on the perceived originality, creativity and their ability to interpret the message of the ads. Originality is a common strategy in advertising and the benefits and risks of original advertising are commonly discussed among advertising practitioners. Yet, there is little empirical research on the efficiency of ad originality and its impact on attention and memory for different ad elements (however see Pieters et al., 2002; Radach et al., 2003).

1.1. Attention to indirect and direct ads

An eye movement study demonstrated that consumers spend more time viewing indirect ("implicit") than direct ("explicit") ads, which reflects an advantage of indirect ads with respect to processing time (Radach et al., 2003). This difference was due to increased number of fixations, while mean fixation duration and saccade amplitude were unaffected by ad type. Moreover, the increased processing time for indirect ads was present in all ad elements when fixations were analyzed with respect to the picture, headline and brand name. In a real-life magazine viewing situation, ad originality increased the number of fixations to the brand and pictorial elements, while it had no effect on attention to the text (Pieters et al., 2002). Importantly, the brand received more attention than the pictorials when the size of these elements was controlled for (Pieters et al., 2002; Radach et al., 2003), suggesting that pictorials do not capture attention away from the brand element. These findings are consistent with research indicating that indirect ads elicit more elaborate information processing than direct

ads (Jeong, 2008; Ketelaar et al., 2008; van Mulken, van Enschot & Hoeken, 2005). Based on earlier research, we hypothesized that *indirect ads would receive more attention* due to the need for deeper message elaboration. In line with earlier studies (Pieters et al., 2002; Radach et al., 2003), we further expected *increased attention to different ad elements in indirect ads*.

Interpreting indirect ads requires combining information across different ad elements (Wyer et al., 2008). Therefore, indirect ads may induce different visual processing than direct ads. Previous research has indicated a relationship between fixation duration and saccade amplitude. Combinations of fixation durations and saccade amplitudes over the course of scene perception are supposed to reflect two types of visual processes: ambient/global or focal/local processing (Follet, Le Meur, & Baccino, 2011; Pannasch, Schulz, & Velichovsky, 2011; Unema, 2005). Ambient fixations are short in duration and they co-occur with long saccades in order to extract contextual information from large distances over the scene regions. Conversely, focal fixations are long in duration and associated with short saccades to perform more detailed detection of local scene elements and objects. We expected here that *indirect ads would elicit ambient processing* because information from these ads is likely to be extracted and integrated over larger distances than in direct ads. In turn, the direct ads were expected to elicit focal processing.

1.2. Memory for indirect and direct ads

Attention improves recall and recognition of printed ads, but the memory results largely depend on the goal of the viewer and task instructions (Rayner & Castelhano, 2008; Rayner, Rotello, Stewart, Keir, & Duffy, 2001; Simola, Kivikangas, Kuisma, & Krause, 2013). Attention to pictorial, brand and text elements were all found to promote memory for brands (Pieters et al., 2002). This contribution, however, varied between ad elements, whereby attention to the brand demonstrated the largest positive influence on brand memory. Ad originality further promoted brand memory by increasing attention to the advertised brand. On the contrary, Radach et al. (2003) found no difference in memory performance between direct and indirect ads. But the high recognition rates indicated that participants had no problems to differentiate the previously seen ads from their unseen counterparts, which suggests a ceiling effect when recognition is tested immediately after the ads were viewed. Here, we tested the effects of the ad type and the delay between ad exposure and recognition test on recognition of brands and ads without the brand logos. We expected that when memory testing is delayed, the test may be more sensitive

to reveal *improved recognition of ads and brands in indirect ads.* We also expected that *recognition of ads and brands are associated with increased attention to these ad elements*.

1.3.Ad evaluation and preference

Prior studies have established a link between viewing time and preference for ads, especially in the case of indirect ads. That is, consumers spent more time viewing indirect advertisements and also rated them as more positive and interesting than direct ads (Radach et al., 2003). The cognitive challenge related to indirect ads increases appreciation (van Mulken et al., 2005) and is thought to arouse an "Aha!" response (Topolinski & Reber, 2010) associated with positive affect when their identity is resolved. However, there is a risk in exerting too much cognitive challenge on viewers. Indirect ("implicit") ads were indeed appreciated more than direct ("explicit") ads, but also more than the so-called "extra implicit" advertisements (van Mulken et al., 2005). These results support an "inverted U-curve" pattern, whereby indirect ads that constitute a moderate comprehension challenge are appreciated more than ads that are too easy or too difficult to comprehend. A recent study further showed that ad evaluation depends on exposure duration (Elsen et al., 2016). The evaluation of indirect ("mystery") ads improved with exposure duration, while the evaluation of direct ads remained high irrespective of exposure duration. Based on earlier findings, we hypothesize that *indirect ads are preferred over direct ads*.

1.4.Current study

The current study comprised two Experiments designed to investigate whether the ad type (direct or indirect) affects attention, in terms of eye movements, to different ad elements. We asked participants to view 40 ads under a free viewing condition. Based on pretest ratings the ads were divided into 20 direct and 20 indirect ads. The ad surfaces were further divided into four main elements – the brand, text, pictorial and product. The *brand* element contained all pictorial and textual references to the brand, including the name, logo, and symbols. The *textual* element included all text in the advertisement, such as headlines, sublines, and body text. The *pictorial* element included all illustrations, graphics and pictures in the ad. The *product* (*i.e.,* the pack shot) was further separated as a discrete element. Ad and brand familiarity were controlled for by choosing ads and brands that were novel to the participants.

We also asked how information extracted from the ads during eye fixations is stored in and retrieved from memory. To our knowledge, only a few eye-tracking studies (Pieters et al., 2002;

Radach et al., 2003) have investigated viewing of direct and indirect advertisements and how the information accumulated during fixations affects memory for brands or product names. These studies, however, tested memory almost immediately (*i.e.,* after 10 minutes delay or after a short distractor task) after the visual exposure to the advertisements. When testing happens on the same day with the exposure, recognition performance is usually better than if testing is delayed (*e.g.*, Huebner & Gegenfurtner, 2012). Here, to examine the effect of temporal delay on ad and brand recognition, the interval between the initial ad exposure and the recognition memory test varied between the experiments. In Experiment 1, recognition of brand logos and ads without logos was tested on the following day from the exposure, whereas in Experiment 2, an otherwise identical recognition test was performed in the same session with the ad exposure.

Finally, to investigate whether the indirect and direct ad content along with attention to ads translates into preference and purchase intention for the brands, participants were asked to rate the brand logos on these dimensions.

2. Experiment 1

In Experiment 1, we examined visual attention to different ad elements in indirect and direct ads when viewing time was restricted to 5 seconds. According to previous research, ad evaluation critically depends on the duration of ad exposure (Elsen et al., 2016). To allow participants a sufficient amount of time to view the ads, which were unfamiliar, the exposure time used here represents the upper end of the range of reported viewing times under normal viewing conditions (*i.e.*, 2–4 seconds Ketelaar et al., 2008). Recognition memory for ad pictorials and brand logos was tested on the next day from the exposure, in order to avoid the ceiling effect observed previously (Radach et al., 2003), and to increase the ecological validity of the memory results in terms of long-term memory effects.

2.1. Material and methods

2.1.1. Participants

Forty-one undergraduate students of humanities and social sciences (29 female, 16 male) with a mean age of 26 years participated in the experiment. All participants had normal or corrected to normal vision and they gave a written informed consent. Before the recordings, they were informed about the progression of the study and were asked to participate in two consecutive

days. They received four cinema tickets (each approximately 10 €) as a compensation for participation. The experiment was performed in accordance with the Declaration of Helsinki with permission by the Ethical Committee of Faculty of Behavioural Sciences, University of Helsinki.

2.1.2. Stimuli

The stimulus material consisted of 40 ads collected from an online database (www.adsoftheworld.com). The stimulus set used in this study can be found at https://adoriginalitystudy.github.io/stim/. The stimuli were not manipulated in any way, but to control for participants' familiarity with the ads, the material was chosen among unfamiliar ads and brands from Australia, New Zealand, and South Africa (*i.e.*, from countries far from Europe). The ads represented the modern layout style in which the pictorial part is large and dominates the layout while the amount of text is reduced (McQuarrie & Phillips, 2008). The ads were saved as bitmaps with 1680 x 1050 pixels resolution (24 x 19 degrees of visual angle). Five participants who were not part of the actual sample, rated the ad contents from very direct (1) to very indirect (9). A split-sample approach was used to divide the advertisements into the direct and indirect conditions based on these ratings (Table 1). Ad content did not differ between the ad types (Table 1).

Table 1.

Means (standard deviations) of pre-test ratings and occurrence of different objects in indirect and direct advertisements along with the percentages covered by the ad elements of the indirect and direct ads in Experiments 1 and 2.

	Indirect	Direct
Pre-test ratings	4.91 (0.99)	3.01 (0.65)
Human	10	9
Animal	4	5
Product	13	17
Face	8	6
Animation	4	5
Food/beverage	1	6
Medicine	3	2
Clothes	3	2
Organization	5	2
Household goods	6	6
Office	2	1
Experiment 1		
The percentage of ad covered by		
Product information	3.15 (10.09)	8.78 (11.31)
Pictorial information*	44.32 (17.68)	31.13 (21.85)
Brand information	1.01 (2.77)	1.15 (2.05)
Textual information	1.15 (2.30)	1.62 (2.85)
Experiment 2		
The percentage of ad covered by		
Product information	6.78 (11.97)	8.92 (10.46)
Pictorial information	47.22 (14.30)	36.32 (18.43)
Brand information	1.38 (1.17)	1.02 (0.80)
Textual information	1.93 (1.29)	2.47 (2.09)

***** indicates a significant difference ($p < .05$) between ad categories in 2-tailed independent samples t-test.

Saliency, that is, how much a visual item stands out from its neighboring items based on color, intensity and orientation change, is known to affect eye movement patterns (Itti & Koch, 2001). To control for potential confounds in gaze behavior resulting from low-level visual properties of the advertisements, we computed the basic image statistics with Matlab (MathWorks, Natick, MA). These included skewness, kurtosis and luminance (nonlinear) (Table 2). The complexity of the images was assessed in terms of the size of the compressed JPG-images in kilobytes (Donderi, 2006). Further, visual perception is strongly influenced by the spatial frequency content of the images. To analyze the spatial frequency content, the ads were decomposed to greyscale and the three RGB (red, green and blue) layers. For each greyscale and RGB layer, a multi-resolution decomposition analysis was performed with Haar discrete bi-dimensional orthogonal wavelets in Matlab (see Delplangue, N'diaye, Scherer, & Grandjean, 2007). The mean energy was calculated separately for high spatial frequencies (HSF, energy in the < 8 pixels/cycle band) and low spatial frequencies (LSF, energy in the > 16 pixels/cycle band). The decomposition was performed because color and grayscale spatial frequency discrimination thresholds are not identical (Vimal, 2002). In addition, apparent contrast for the high and low frequency bands at each layer was calculated (using ImageJ 1.43 software). Independent samples *t*-test showed no differences between the ad types in low-level image properties (Table 2).

Table 2.

Means (standard deviations) of the physical stimulus characteristics for the indirect and direct ads. The *t* and *p* values are obtained from independent samples t-test. HSF = High Spatial Frequencies, < 8 pixels/cycle band, LSF = Low Spatial Frequencies, > 16 pixels/cycle band.

	Indirect	Direct	*t*(38)	p
Complexity (JPG size)	333.95 (156.90)	277.05 (135.91)	1.29	.205
Luminance (mean)	175.69 (45.87)	164.73 (44.75)	0.77	.449
Luminance (sd)	67.98 (24.57)	75.07 (24.11)	0.92	.363
Kurtosis	2.60 (6.64)	2.35 (12.28)	0.08	.937
Skewness	-0.94 (1.52)	-0.66 (1.75)	0.54	.590
HSF Energy (x 10^{-7})				
Red	4.69 (1.21)	4.35 (1.24)	0.88	.383
Green	4.57 (1.22)	4.32 (1.15)	0.69	.497
Blue	4.37 (1.30)	4.15 (1.15)	0.57	.569
Grey	4.38 (1.23)	4.11 (1.15)	0.71	.483
LSF Energy (x 10^{-7})				
Red	4.69 (1.20)	4.36 (1.24)	0.86	.396
Green	4.57 (1.22)	4.33 (1.16)	0.66	.517
Blue	4.37 (1.29)	4.16 (1.16)	0.56	.581
Grey	4.38 (1.22)	4.12 (1.15)	0.68	.500
HSF Contrast				
Red	0.34 (0.25)	0.43 (0.29)	0.95	.349
Green	0.36 (0.24)	0.42 (0.29)	0.66	.516
Blue	0.41 (0.28)	0.45 (0.28)	0.46	.650
Grey	0.40 (0.26)	0.46 (0.29)	0.65	.517
LSF Contrast				
Red	0.12 (0.06)	0.13 (0.07)	0.27	.790
Green	0.12 (0.06)	0.12 (0.07)	0.06	.950
Blue	0.13 (0.06)	0.13 (0.07)	0.06	.953
Grey	0.13 (0.06)	0.13 (0.06)	0.14	.889

2.1.3. Procedure

On day 1, the ads (20 direct, 20 indirect) were shown for five seconds in a free viewing task. The ads were presented in random order interleaved with text-ad pairs. Participants were instructed to read the texts of the text-ad pairs to rate how interesting the texts were on a scale of 1 to 6. They were also told that among text-ad pairs, full page ads were presented and that no response was required from them because the next stimulus was presented automatically. The results concerning the text-ad pairs have been reported elsewhere. To control for the initial gaze location on the ads, participants were asked to fixate a central fixation cross on a gray background for 3 seconds between the stimuli. After completing the task, participants were told that the experiment continues on the next day, but they were not informed about the nature of the forthcoming memory tests.

On day 2, after approximately 24-hours from the ad viewing task, participants performed a set of memory tests. They were asked to recognize i) the brand logos cut out of the ads and ii) the ads without logos among new (lure) logos and ads. Half of the logos and ads were shown on day 1, while the other half were new. The task was to indicate whether a cutout logo or an ad was previously seen by clicking the "yes" or "no" buttons. Each trial in the recognition memory tests began with a fixation cross presented for 1.2 seconds. The fixation cross was replaced by the logo or the ad for until response. The next trial was initiated 300 ms after the response.

After the recognition tests, participants were shown again the 40 logos presented as part of the ads on day 1. They were asked to rate how positive their opinion of the brand was on scale 1 (not very positive) to 6 (very positive) and how likely it was that they would purchase the brand on a scale of 1 (very unlikely) to 6 (very likely).

2.1.4. Apparatus

The advertisements were presented as RGB images on 22-in. screen from a viewing distance of 80 cm. Stimulus timing was controlled by the Presentation software (Neurobehavioral Systems, Inc., Albany, CA, USA). Participants were comfortably seated during recordings. Eye movements were recorded with a SMI RED50 remote eye-tracking system (Sensomotoric Systems Instrument, Teltow, Germany) with a 50 Hz sampling rate. The eye-tracker was calibrated for each participant before the experiment using nine calibration points covering the whole screen area.

2.1.5. Data analysis

Eye movement data. The raw eye movement data were imported to OGAMA software (Voßkühler, Nordmeier, Kuchinke, & Jacobs, 2008) for event detection and processing of eye movement variables. Fixation detection was based on a dispersion-threshold-identification (I-DT) algorithm (Salvucci & Goldberg, 2000), with the dispersion radius of approximately 1° and minimum fixation duration of 80 ms. First, total number of fixations, mean fixation duration and mean saccade amplitude were calculated for the whole ad surfaces. Second, total number of fixations, mean fixation duration and time to first fixation (*i.e.*, the time from trial onset until the first fixation was detected on an AOI) were calculated for each predefined area of interest (AOI) and for each participant and advertisement. The AOIs were drawn manually over the visual information related to the pictorial, brand, product, or text. Table 1 shows the percentages covered by the key elements in the indirect and direct ads.

The statistical analyses were performed with the IBM SPSS Statistics (Version 22 for Macintosh). Eye movements detected over the whole ad surfaces and on each AOI (pictorial, brand, product, and text) were analyzed using a Generalized Estimation Equations, GEE model with the ad type (indirect vs. direct) as a factor. Poisson distribution with logarithmic link function was used to analyze number of fixations detected over the whole ads, while negative binomial distribution with logarithmic link function was used to analyze number of fixations detected on the AOIs. Gamma distribution using the inverse link function was used to analyze time to first fixation and mean fixation duration. We used normal distribution for the analysis of saccade amplitudes over the whole ads. The negative binomial distribution with logarithmic link function is typically used for analyzing count measures and a gamma distribution is used to model eye movement data (*e.g.,* Wedel, Pieters, & Liechty, 2008) when the distributions are non-normal. Similar to Pieters et al. (2002), we controlled for the effect of AOI size on eye movement measures by adding to the model the proportion covered by the respective AOI as a covariate.

GEE (*e.g.*, Hardin & Hilbe, 2003) is an extension to the standard array of Generalized Linear Models (GLMs) with the exception that the GEE models do not require that individual subjects or observations need to be independent. The GEE models can thus handle situations where responses are correlated. GEE models can also handle data with missing values more efficiently

than the traditional repeated measures ANOVA. For example, in the current study, not all ad elements were fixated in every ad. The design of the present study is repeated measures design where the distributions of the dependent variables are non-normal (*e.g.*, variables such as number of fixations and fixation duration on ads were skewed to the right) and the structure of the missing value pattern can be considered missing at random (Little & Rubin, 1987). To explore whether trials were missing at random, we created binomial variables (1=missing, non-fixated; 0=non-missing, fixated) for each ad element. We then analyzed these variables using a GEE model with a binomial distribution and the ad type (indirect vs. direct) as a factor. The ad pictorials were non-fixated in 0.3% of the trials. Further, the brand logos were non-fixated in 29.6%, the product information in 12.9% and the text in 13.6% of the trials. The number of trials in which the product and pictorial information were non-fixated, did not differ between the ad conditions. However, the number of trials in which the brand logos were non-fixated [$\chi^2(1) = 8.07$, $p = .005$] and the text was non-fixated [$\chi^2(1) = 6.74$, $p = .009$] were higher for the direct ads. Although, the trials were not missing fully at random, we considered the GEE model well suited for the design of the current study.

Behavioral data. The results from the logo recognition and ad recognition tasks were also analyzed with a GEE model with the ad type (indirect vs. direct) as a factor. A binomial distribution was used to study the hits and misses ("yes" and "no" responses to previously seen logos or ads). In order to test the relation between the attention and memory performance, the analyses included total number of fixations on logos or ads as a covariate. Preference and purchase intention ratings for the brands were studied using a GEE model with normal distribution and ad type as a factor.

2.2. Results

2.2.1. Eye movement results

Table 3 summarizes the eye movement results for the whole ad surfaces and for the AOIs (pictorial, brand, product and text) in Experiment 1 separately for the indirect and direct ad conditions. On average, the number of fixations did not differ between the indirect and the direct ads. The mean fixation duration was, however, longer in the direct than in the indirect condition. The saccades were longer in the indirect than in the direct ads.

Table 3.

Estimated marginal means (standard errors) for the indirect and direct ads and tests of model effects (Wald Chi-Square, $\chi 2$ and *p*-value) obtained from the General Estimated Equations (GEE) for the eye movement measures collected in Experiment 1 (n=41). Bolded *p*-values indicate significant effects ($p < .05$).

	Indirect	Direct	$\chi 2(1)$	*p*
Whole ad				
Number of fixations	13.73 (0.18)	13.58 (0.21)	1.76	.185
Mean fixation duration (ms)	346.68 (7.09)	353.75 (7.57)	6.61	**.010**
Saccade length (deg)	6.08 (0.07)	5.72 (0.08)	42.59	**6.7E-11**
Pictorial				
Number of fixations	8.71 (3.07)	7.21 (2.58)	118.85	**<.001**
Mean fixation duration	334.21 (128.81)	357.27 (151.77)	11.39	**.001**
Time to first fixation[1] (ms)	505.94 (444.80)	961.07 (1711.26)	2.74	.098
Brand logo				
Number of fixations	2.06 (0.13)	2.30 (0.14)	8.74	**.003**
Mean fixation duration	462.06 (26.45)	444.30 (28.60)	0.87	.352
Time to first fixation	2141.40 (133.22)	2111.72 (119.27)	0.13	.723
Product				
Number of fixations	2.60 (0.31)	3.84 (0.48)	200.54	**<.001**
Mean fixation duration	399.68 (58.10)	345.30 (44.50)	22.15	**3.00E-6**
Time to first fixation	1715.83 (459.07)	1682.12 (442.07)	0.32	.571
Text				
Number of fixations	3.82 (0.18)	3.65 (0.15)	3.07	.080
Mean fixation duration	400.65 (26.86)	349.33 (16.56)	16.63	**4.5E-5**
Time to first fixation	1582.71 (107.16)	1628.35 (112.90)	1.05	.306

[1]The time to fixate an AOI was calculated from only those ads which contained the specific AOI and in which the AOI was fixated at least once.

Ad pictorials. Viewing the pictorials of indirect and direct ads differed in the number of fixations with more fixations made on the indirect than on the direct condition (Table 3). In contrast, mean fixation duration was shorter in the indirect than in the direct ads. These results show that pictorials in the indirect condition were fixated with more but shorter fixations than in the direct ads. Time to the first fixation on the pictorials from the ad onset did not differ between the ad types.

Brand logos. The brand logos were fixated more frequently in the direct than in the indirect condition (Table 3). The ad conditions did not differ in mean fixation duration on the brand logos. Moreover, the time to the first fixation on the logos from the ad onset did not differ between the ad types.

Product information. The number of fixations on the product information was higher but the mean fixation duration was shorter for the direct than for the indirect ads (Table 3). The product information was, thus, fixated with more frequent but shorter fixations in the direct condition. The time to the first fixation on the product information from the ad onset did not differ between the ad types.

Text. The mean fixation duration on the text was longer for the indirect than for the direct ads. The number of fixations and the time to the first fixation on the text from the ad onset did not differ between the ad types.

2.2.2. Memory results

The memory results (Figure 1) showed that participants were able to recognize 20% of the logos and 93% of the ads without logos among the lure logos and lure ads. The GEE model showed no significant difference in logo recognition between the indirect and direct ads [$\chi2(1) = 0.60$, $p = .807$]. However, total number of fixations on logos during the initial exposure to ads, on day 1, affected logo recognition [$\chi2(1) = 18.00$, $p = 2.20E\text{-}5$] with improved recognition for logos viewed frequently during day 1.

Recognition of ads without logos did not differ between the ad types [$\chi2(1) = 0.35$, $p = .555$] (Figure 1). Further, the total number of fixations on ads on day 1 did not affect ad recognition [$\chi2(1) = 0.01$, $p = .930$].

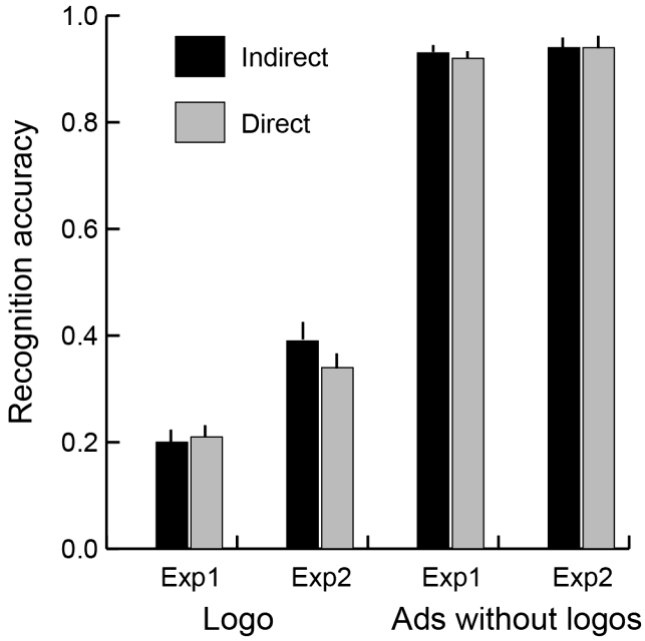

Figure 1. **The recognition memory results.** Mean accuracy in the recognition memory task for brand logos and ads without logos shown separately for the indirect ads (in black) and direct ads (in grey) and for Experiment 1 (*n*=41) and Experiment 2 (*n*=37). The error bars denote standard error of mean.

2.2.3. Preference for brands

The preference ratings for brand logos differed between the indirect and direct ads [$\chi_2(1) = 18.33$, $p = 1.90E\text{-}5$], whereby logos of the indirect ads were preferred over the logos of direct ads (Figure 2). The ratings of purchase intention did not differ between the brands of indirect and direct ads [$\chi_2(1) = 0.64$, $p = .425$].

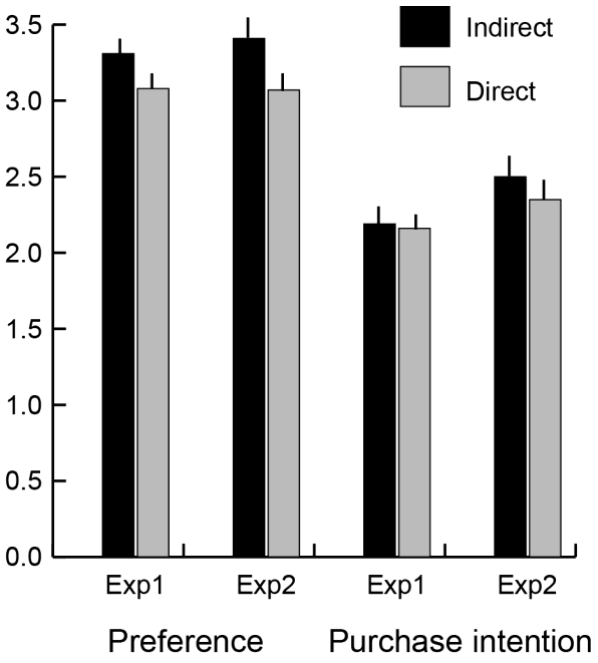

Figure 2. **Preference and purchase intention results.** Participants rated preference for brand logos on a scale 1 (not very positive) to 6 (very positive) and how likely they would purchase the brand on a scale of 1 (very unlikely) to 6 (very likely). These ratings are shown separately for the indirect ads (in black) and direct ads (in grey) and for Experiment 1 (*n*=41) and Experiment 2 (*n*=37). The error bars denote standard error of mean.

2.3. Discussion

2.3.1. Indirect and direct ads elicit different patterns of attention

The results of Experiment 1 showed that when ad viewing time was limited to 5 seconds, there were increased number of fixations toward ad pictorials and longer fixation durations in texts and product elements of indirect than direct ads. On the contrary, brand and product elements received more frequent fixations in the direct as compared to the indirect ads. Our expectation was that all ad elements would be fixated more frequently in the indirect ads. The current results were partly inconsistent with our hypotheses and with previous findings indicating that all ad elements (Radach et al., 2003) and especially brand and pictorials (Pieters et al., 2002) are fixated more frequently in indirect ads.

Indirect or original advertising has been shown to elicit more elaborate information processing than direct advertising (Jeong, 2008; Ketelaar et al., 2008; van Mulken et al., 2005), but it has

also been criticized for its capacity to attract attention to the visual or verbal message at the expense of attention to the advertised brand and product. The current findings are indeed consistent with this view by indicating that increased number of fixations on pictorial and longer fixations on textual content were accompanied by fewer fixations on the brand and product information of indirect ads. Indirect ads thus elicited more elaborate processing of the visual and textual information combined with more superficial processing of the brand and product information.

The eye movement patterns on the entire ad surface further differed between the ad types. These results showed that the direct ads were processed with longer fixation duration and with shorter saccades. On the contrary, the indirect ads were, on average, processed with shorter fixations but with longer saccades. Previous research indicates that different subpopulations of eye fixations during scene perception contribute to different modes of attention (Pannasch et al., 2011). The distinction of fixation subpopulations is based on the lengths of the preceding saccades, and suggests that in the *focal attention mode*, short saccades are surrounded by relatively long fixations (Unema, 2005). In the *ambient attention mode*, longer saccades are accompanied by shorter fixations. In line with the expectations, the present results suggest that focal attention mode was more prevalent during the processing of direct advertisements. In contrast, the processing of indirect ads was characterized by ambient attention mode possibly because indirect ads are often abstract and use visual metaphors (McQuarrie & Phillips, 2005). Viewers need to scan the whole surface to find cues that would help them to extract the hidden message of indirect ads. Similar attention modes were observed in a study that investigated viewing of abstract and representative paintings (Uusitalo, Simola, & Kuisma, 2012).

The analysis of eye movements with respect to the key elements of advertisements indicated that the aforementioned attention modes were most prominent during the processing of pictorial elements. The pictorials of direct ads were processed in the focal mode as suggested by longer but fewer fixations. The ad pictorials were possibly helpful in interpreting the ad message in the direct condition. In contrast, frequent but short fixations were detected on the pictorials of indirect ads, suggesting that the indirect pictorials were processed in the ambient mode (Pannasch et al., 2011). The ambient mode may be applied to the indirect condition, where the pictorials are not very helpful for interpreting the ad message.

2.3.2. No memory differences between indirect and direct ads

The recognition memory results did not confirm our first hypothesis concerning the memory effects. Only 20% of the brands were recognized correctly, and the recognition rates did not differ between direct and indirect ads. The recognition rates for brands were below chance-level, suggesting a floor effect. This is most likely due to the 24-hour delay between the ad viewing and memory testing as well as the indirect nature of the recognition tests. That is, the participants were not aware of the forthcoming memory tests. Contrary to the prediction, the delayed recognition test was unable to reveal differences between the ad types. Similarly, the recognition accuracy of ads without logos did not differ between indirect and direct ads. These results support previous research (Radach et al., 2003) that also found no difference in memory performance between direct and indirect ads. Nevertheless, the combined analysis of attention and memory results showed that frequent fixations on brand logos during the initial exposure were associated with improved logo recognition. This result is in line with our hypothesis and previous findings (Pieters et al., 2002; Simola et al., 2013), indicating that attention enhances subsequent memory for brands. However, no association between the total number of fixations on the ads and recognition for ads without logos was observed.

2.3.3. Brands associated with indirect ads were preferred over brands of direct ads

The preference ratings were higher for brands that were associated with indirect than direct ads. This finding confirms our hypothesis and is consistent with previous studies that have shown higher appreciation for indirect than for direct advertisements (Radach et al., 2003; van Mulken et al., 2005). We did not find any difference in purchase intention between direct and indirect ads.

2.3.4. Limitations

There are a number of important caveats that must be taken into account when considering the present results. The ads were divided into indirect and direct conditions according to pre-test ratings and we did not ask how viewers interpreted the ads; thus we do not know how the viewers experienced the ads and whether they were able to resolve what was being advertised. To improve our ability to infer whether the results were due to positive and entertaining qualities and the cognitive challenge related to the indirect ads, Experiment 2 included an online survey that asked participants to rate the ads on different dimensions related to the content of the ads. We further asked whether participants were able to interpret the ads

correctly.

Another important variable moderating attention and memory to ads is exposure duration (see Radach et al., 2003). We showed the ads for five seconds, which corresponds to the upper end of exposure durations reported under natural viewing conditions (Ketelaar et al., 2008). In normal viewing, the duration may be shorter, for example, in the range of two to four seconds (see Ketelaar et al., 2008). Experiments employing forced and long exposure may overestimate the positive effects of indirect ads (Ketelaar et al., 2008). To find out whether the present results were due to the exposure duration, Experiment 2 allowed viewers to proceed in the task at their own pace.

3. Experiment 2

Experiment 2 tested the effect of indirect versus direct advertising when the ad exposure duration was unlimited. Further, we included an online survey, which measured participants' familiarity with the ads, asked them to rate the ads on different dimensions exploring the ad originality, creativity, pleasantness and implicitness of the ads and confirmed whether they were able to interpret the ads correctly. Participants filled in the survey after they had taken part in the eye-tracking experiment. Based on prior studies (Jeong, 2008; Ketelaar et al., 2008, van Mulken et al., 2005), we predicted that *indirect ads would be perceived as more original, unusual, surprising, interesting and intellectually challenging than direct ads*. Moreover, the assumption was that *the cognitive challenge related to indirect ads would increase appreciation of the indirect ads*. The survey data also helped us to back up the conclusions of Experiment 1 that were made on the basis of the characteristics of the indirect versus direct ads.

3.1. Material and methods

3.1.1. Participants

Thirty-nine undergraduate students of humanities, social sciences and economics (35 female, 4 male) with a mean age of 22 years participated in the experiment. All participants had normal or corrected to normal vision. None of them were aware of the purpose of the study or took part in Experiment 1. Before the recordings, they were informed about the progression of the

experiment and they gave a written informed consent. They received course credits and one cinema ticket (of approximately 10 €) as a compensation for participation.

3.1.2. Procedure

The procedure was identical to Experiment 1. The same advertisements were used and the ads were presented in random order among text-ad pairs. Participants were instructed to read the texts of the text-ad pairs and rate how interesting the texts were on a scale of 1 to 6. They were also told that among text-ad pairs, full page ads were shown and that they could look at these ads for as long as they wanted and then press a button to move on to the next stimulus. Unlike in Experiment 1, the recognition memory tests for the brand logos and for the ads without logos was conducted in the same session after approximately 45 min delay from the ad exposure during which they took part in a reading task.

Similar to Experiment 1, after the recognition tests, participants were shown again the 40 logos presented as part of the ads. They were asked to rate how positive their opinion of the brand was on scale 1 (not very positive) to 6 (very positive) and how likely it was that they would purchase the brand on a scale of 1 (very unlikely) to 6 (very likely). In Experiment 2, the participants additionally rated how familiar they were with the brand on a scale of 1 (not familiar at all) to 6 (very familiar).

After participating in the eye-tracking experiment, the participants received a link to an online survey via email. The survey was created and administered using the PsyToolkit web-based service (Stoet, 2017). Participants were asked to fill in the survey within 24 hours from the eye-tracking experiment. In the survey, the ads were shown one at a time in random order, followed by 11 multiple-choice and two open questions presented always in the same order (Appendix A). Completing the survey took, on average, 70 minutes.

3.1.3. Apparatus

The advertisements were presented as RGB images on 24-in. screen from a viewing distance of 55 cm. Eye movements were recorded with an SR Research EyeLink® 1000+ eye -tracker (SR Research, Ltd., Kanata, Ontario, Canada) with a 1920 x 1080 resolution and a 1000 Hz sampling rate. The stimulus presentation was controlled with SR Research Experiment Builder software. A randomized target order 13-point calibration routine and a separate validation were

performed using the EyeLink 1000+ software for each participant before the experiment. The average calibration error was 0.58° (± 0.28 SD).

3.1.4. Data analysis

Eye movement data. Saccades were detected from the raw eye coordinate data with the standard saccade detection algorithm by EyeLink with the following thresholds: minimum velocity of 30 °/sec, minimum acceleration of 8000 °/sec/sec and minimum motion of 0.1°. Fixations were defined as periods that were not blinks or saccades. The eye movement data were analyzed with SR Research Data Viewer software. Fixations shorter than 80 ms were either merged with a nearby fixation (distance <1°) or discarded. The area of interests (AOIs) were re-drawn manually over the pictorial, brand, product, or text information. Table 1 shows the percentages covered by the key elements in the indirect and direct ads. Due to the change in the eye-tracker and the respective analysis software, the AOI sizes differed slightly from those of Experiment 1. However, the statistical analyses were identical with Experiment 1, and controlled for the effect of AOI size on eye movement measures by including the AOI size as a covariate in the GEE model.

Similar to Experiment 1, we explored whether trials were missing at random in Experiment 2. To do so, we created binomial variables (1=missing, non-fixated; 0=non-missing, fixated) for each ad element and analyzed these variables using a GEE model with a binomial distribution and the ad type (indirect vs. direct) as a factor. The ad pictorials were non-fixated in 0.2%, the brand logos in 19.6%, the product information in 8.0% and the text in 8.9% of the trials in Experiment 2. The number of trials in which the different ad elements were non-fixated did not differ between the ad conditions. Thus, the data was missing at random in Experiment 2.

Behavioral and survey data. The statistical analyses for the recognition memory, preference and purchase intention ratings for the brands were identical with Experiment 1. To compare recognition memory performance as well as the preference and purchase intention ratings for the brands between the two experiments, the ratings were subjected to 2 x 2 repeated measures analysis of variance (ANOVA) with experiment (Experiment 1 and 2) as between-participants and ad type (indirect, direct) as within-participants factors. Multiple comparisons were adjusted with the Bonferroni correction. Finally, the ratings from the web survey were analyzed using a

GEE model with ad type as a factor. Negative binomial distribution with logarithmic link function was used to analyze familiarity with the ads, while normal distribution was used for analyzing all other questions (Appendix A).

The familiarity ratings obtained from the web survey (Question 1 in Appendix A) were taken into account in the analysis by removing ads that were rated as higher than two. As a control for familiarity, this resulted in a removal of 0.5% of the total number of trials.

3.2. Results

3.2.1. Eye movement results

Table 4 shows the eye movement results for the whole ad surfaces and for the AOIs (pictorial, brand, product and text) in Experiment 2 separately for the indirect and direct ad conditions. Participants spent on average 6.5 seconds viewing the ads, when viewing duration was not restricted and when they were allowed to proceed at their own pace. The total viewing time was longer for the indirect than for the direct ads. Further, the number of fixations was higher and the saccades were longer when participants viewed the indirect than direct ads. The mean fixation duration did not differ between the ad conditions.

Table 4.

Estimated marginal means (standard errors) for the indirect and direct ads and tests of model effects (Wald Chi-Square, χ^2 and *p*-value) obtained from the General Estimated Equations (GEE) for the eye movement measures collected in Experiment 2 (*n*=39). Bolded *p*-values indicate significant effects ($p < .05$).

	Indirect	Direct	$\chi^2(1)$	*p*
Whole ad				
Total viewing duration (ms)	6757.26 (361.15)	6177.48 (330.39)	16.16	**5.80E-5**
Number of fixations	23.91 (1.31)	21.80 (1.14)	18.56	**1.60E-5**
Mean fixation duration (ms)	224.95 (3.60)	227.43 (3.66)	3.01	.083
Saccade length (deg)	6.32 (0.14)	6.08 (0.13)	17.91	**2.30E-5**
Pictorial				
Number of fixations	13.82 (0.83)	10.09 (0.56)	165.66	**<.001**
Mean fixation duration	232.37 (4.19)	233.18 (4.61)	0.15	.703
Time to first fixation[1] (ms)	52.77 (6.25)	163.36 (12.62)	129.11	**<.001**
Brand logo				
Number of fixations	2.67 (0.20)	2.89 (0.18)	2.41	.120
Mean fixation duration	228.00 (4.90)	224.19 (5.05)	0.67	.412
Time to first fixation	2775.25 (121.93)	1931.08 (77.43)	98.15	**<.001**
Product				
Number of fixations	3.97 (0.25)	4.42 (0.24)	8.06	**0.005**
Mean fixation duration	221.99 (4.19)	242.69 (5.17)	29.42	**5.82E-8**
Time to first fixation	1042.73 (53.61)	930.10 (47.32)	3.42	.064
Text				
Number of fixations	7.76 (0.46)	6.13 (0.34)	52.83	**3.6E-13**
Mean fixation duration	209.54 (3.57)	218.76 (3.82)	10.44	**.001**
Time to first fixation	1511.54 (67.26)	1508.88 (79.20)	0.002	.966

[1]The time to fixate an AOI was calculated from only those ads which contained the specific AOI and in which the AOI was fixated at least once.

Ad pictorials. The number of fixations on ad pictorials was higher for the indirect versus direct ads (Table 4), but the mean fixation duration on ad pictorials did not differ between the ad types. The first fixations on the pictorials after the ad onset occurred faster in the indirect than in the direct condition.

Brand logos. The time to fixate the brand logos for the first time after the ad onset was faster in the direct than in the indirect condition (Table 4). The ad conditions did not differ in mean fixation duration or in number of fixations on the brand logos.

Product information. Similar to Experiment 1, the number of fixations on the product information was higher in direct than in indirect ads (Table 4). Further, mean fixation duration on the product information was longer in the direct ads. Contrary to Experiment 1, in which the direct ads were fixated with more frequent but shorter fixations, both mean fixation duration and the number of fixations on product information were increased in the direct condition in Experiment 2. The time to fixate the product information for the first time after the ad onset did not differ between the ad types.

Text. The number of fixations on the text was higher but the mean fixation duration was shorter in the indirect than in the direct ads (Table 4). The time to first fixations on the text from the ad onset did not differ between the ad types.

3.2.2. Memory results

In Experiment 2, recognition of brand logos was more accurate in the indirect than in the direct condition [$\chi^2(1) = 16.79$, $p = 4.20E\text{-}5$] when the number of fixations on logos was controlled for (Figure 1). Further, the number fixations on logos during the initial exposure to the ads affected logo recognition [$\chi^2 (1) = 3.80$, $p = .049$] with improved logo recognition for those logos that were fixated frequently during the ad viewing task.

Accuracy in recognition of ads without logos did not differ between the ad types [$\chi^2 (1) = 2.32$, $p = .128$] in Experiment 2 (Figure 1), but the total number of fixations on ads during the initial viewing was associated with ad recognition [$\chi^2 (1) = 6.76$, $p = 0.00931$] with higher accuracy for those ads that were fixated more frequently during initial viewing.

We further compared the recognition results between the two experiments that varied the delay (either 24 hours or 45 minutes) between ad exposure and the recognition testing. Accuracy in the logo recognition task differed between the experiments [$F(1,76) = 23.95$, $p = 0.50E\text{-}5$, $\eta_{p2} = .240$]. However, the main effect was qualified by an experiment x ad type interaction [$F(1,76) = 4.85$, $p = .031$, $\eta_{p2} = .060$], whereby accuracy in Experiment 2 than in Experiment 1 was higher for logos of both ad types (indirect: $t(76) = 5.03$, $p = 0.30E\text{-}5$ and direct: $t(76) = 3.73$, $p = 4.23E\text{-}4$). In Experiment 2, accuracy was further higher for indirect versus direct logos ($t(36) = 2.64$, $p = .011$) (Figure 2 a). Recognition of ads without logos differed neither between the experiments [$F(1,76) = 0.59$, $p = .445$, $\eta_{p2} = .008$] nor the ad types [$F(1,76) = 0.38$, $p = .846$, $\eta_{p2} = .000$].

3.2.3. Familiarity and preference for brands

In order to control for participants' familiarity with the brands, we asked them to rate the logos on familiarity. The average ratings (indirect: 1.23 ± 0.72 SD; direct: 1.21 ± 0.70 SD) indicated that participants were not familiar with the brands and that there was no difference in familiarity between the ad types [$\chi_2(1) = 0.68$, $p = .410$].The preference ratings for brand logos in Experiment 2 replicated the results of Experiment 1, indicating that the logos of indirect ads were preferred over the logos of direct ads [$\chi_2(1) = 61.09$, $p = 5.44E\text{-}15$] (Figure 2). Moreover, in Experiment 2, the purchase intention ratings also differed between the ad types [$\chi_2(1) = 8.97$, $p = .003$] with increased purchase intention for the logos of indirect ads.

The combined analyses of Experiments 1 and 2 indicated a main effect of ad type on the preference ratings [$F(1,76) = 65.17$, $p = 8.00E\text{-}12$, $\eta_{p2} = .462$] with higher preference for the indirect ads, while there was no difference between the experiments [$F(1,76) = 0.12$, $p = .735$, $\eta_{p2} = .002$]. Similarly, the purchase intention ratings were overall higher for the indirect ads [$F(1,76) = 7.56$, $p = .007$, $\eta_{p2} = .090$], while the experiment x ad type interaction [$F(1,76) = 3.17$, $p = .079$, $\eta_{p2} = .040$] and the effect of experiment [$F(1,76) = 2.64$, $p = .109$, $\eta_{p2} = .034$] did not reach significance.

3.2.4. Ad survey results

Table 5 summarizes the results from the 11 Likert-scale questions presented in the web survey (Appendix A). According to these results, direct ads conveyed the message of advertised products faster and were easier to interpret than indirect ads. However, indirect ads were

experienced as more original, surprising and intellectually challenging than direct ads. Indirect and direct ads did not differ in familiarity, liking, purchase intention, or in how interesting or visual pleasant the participants rated the ads.

Table 5.

Means (standard errors) of the ratings for the indirect and direct ads collected in the web survey (Appendix A) completed by participants (n=38) of the Experiment 2. The Wald Chi-Square, $\chi 2$ and p-values were obtained from the General Estimated Equations (GEE). Bolded p-values indicate significant effects ($p < .05$).

	Indirect	Direct	$\chi 2(1)$	p
Familiarity	1.01 (.01)	1.02 (.01)	1.93	.164
Easiness of interpretation	3.03 (.10)	2.31 (.07)	98.24	**<.001**
Duration of interpretation	3.07 (.10)	2.32 (.07)	106.64	**<.001**
Liking	3.48 (.11)	3.47 (.09)	0.03	.862
Interesting	3.63 (.10)	3.55 (.09)	1.71	.191
Visually pleasant	3.73 (.08)	3.66 (.09)	1.05	.305
Intellectually challenging	3.49 (.10)	3.06 (.10)	33.03	**9.06E-9**
Original	3.75 (.09)	3.59 (.09)	9.44	**.002**
Surprising	3.52 (.09)	3.34 (.09)	10.42	**.001**
Typical	3.78 (.08)	3.72 (.08)	1.74	.187
Purchase intention	2.91 (.12)	2.78 (.11)	2.88	.090

Furthermore, 86.90% (±15.36 SD) of the indirect and 93.62% (±11.27 SD) of the direct ads were identified correctly when the participants were asked: “What was the product that was being advertised?” An independent samples t-test (2-tailed) showed no difference between the ad types ($t(38) = 1.58$, $p = .122$) in the percentage of correctly identified ads. All participants (n=38) were able to name the advertised product in 14 out of 40 ads, and from these ads, 11 were direct and three indirect. Six ads, four indirect and two direct ads, fell into the lowest category of product identification (with 50–70% accuracy). Moreover, ad identification was

unrelated to the total ad viewing time (Spearman's r = -.026, p = .872) and total number of fixations (Spearman's r = -.054, p = .739) on the ads.

Finally, we examined the correlations between ad survey results and the total viewing time for indirect and direct ads (Table 6). These results indicated that total viewing time was positively associated with how interesting, intellectually challenging, original, surprising and typical to the product category the ads were rated. Similar correlations were observed independent of the ad type, except the finding that the visually pleasant ads were viewed longer in direct but not in indirect condition. Further, difficulty in interpreting the ad was associated with longer viewing time in direct but not in indirect condition.

Table 6.

Correlations (Spearman's rho) between total viewing time and ad survey results in Experiment 2 (n=38) separately for the indirect and direct ads.

Total viewing time	Indirect	Direct
Familiarity	-.056	-.012
Easiness of interpretation	.004	**.087***
Duration of interpretation	.006	.038
Liking	.039	.046
Interesting	**.112****	**.145****
Visually pleasant	.043	**.111****
Intellectually challenging	**.156****	**.217****
Original	**.178****	**.178****
Surprising	**.222****	**.206****
Typical	**.134****	**.089***
Purchase intention	.073	.047

* indicates a significant correlation at the $p < .05$ level (2-tailed).
** indicates a significant correlation at the $p < .01$ level (2-tailed).

3.3. Discussion

3.3.1. Indirect ads are viewed longer and elicit different patterns of attention than direct ads

Participants spent more time viewing indirect than direct ads, when viewing time was unlimited. This reflects an advantage of indirect ads with respect to processing time, replicating earlier research (Radach et al., 2003). Longer viewing time of indirect ads was due to increased number of fixations, while mean fixation duration was unaffected by ad type. Moreover, the saccades were longer in indirect than in direct ads, which is suggestive of an ambient processing mode (Pannasch et al., 2011) that was similarly observed for indirect ads in Experiment 1. These results strengthen the finding that ad type rather than the limited exposure time caused the differences in viewing patterns between indirect and direct ads.

The eye movements over the key elements of advertisements showed that the ad exposure time manipulation did not affect viewing of the ad pictorials. Across the experiments, the pictorials were fixated more frequently in the indirect condition. In addition, the pictorials were fixated faster for the first time in the indirect than in the direct ads when viewing time was unlimited. The brand logos, on the contrary, were fixated faster for the first time in the direct ads, suggesting a benefit of brand processing in direct ads when ad exposure time was unrestricted. Further, the product element was fixated more frequently in the direct than indirect ads across the experiments. The fixation duration was longer on the product information in direct ads, unlike in Experiment 1, where the fixations on the product were longer in indirect ads. When viewing time was unlimited, the texts were fixated more frequently but with shorter fixations in indirect ads, whereas in Experiment 1, the fixations on the text were longer in indirect ads.

3.3.2. Recognition was more accurate for the brand logos of indirect ads

The overall recognition accuracy for brand logos was higher when the ad exposure time was unlimited and the recognition was tested in the same session (after approximately 45 minutes) from the ad exposure. Moreover, recognition was more accurate for brand logos of indirect than direct ads in Experiment 2. The floor effect observed for logo recognition in Experiment 1, thus, disappeared as indexed by the improved sensitivity of the logo recognition test in Experiment 2. Recognition of ads without logos did not differ between ad types, replicating the results of Experiment 1 and prior research (Radach et al., 2003).

In both experiments, the combined analysis of attention and memory results showed that frequent fixations on brand logos during the initial exposure were associated with improved logo recognition. Further, more frequent fixations on ads during the initial exposure were associated with more accurate recognition of the ads without logos in Experiment 2. In accordance with previous findings (Pieters et al., 2002; Simola et al., 2013), these results indicate that attention enhances subsequent memory for both brands and ads. The association between number of fixations and ad recognition accuracy was possibly due to the unlimited ad exposure time in Experiment 2. This allowed participants to flexibly adapt their viewing patterns, which resulted in higher variability in the number of fixations on ads.

3.3.3. Brands associated with indirect ads were preferred over brands of direct ads

Similar to Experiment 1, the preference ratings were higher for brand logos of indirect than direct ads. Furthermore, the purchase intention ratings were higher for brands of indirect ads in Experiment 2. Prior studies have established a link between viewing time and preference for ads, especially in the case of indirect ads. That is, consumers spent more time viewing indirect advertisements and also rated them as more positive and interesting than direct ads (Radach et al., 2003). The results here supported these findings by demonstrating longer viewing times of indirect ads and higher preference ratings for the brands of these ads. The analyses that compared preference and purchase intention ratings between the experiments, showed no between-experiment differences in these ratings. Together, these results suggested that the longer viewing time of indirect ads, when exposure time was unlimited, rather than the difference in delay between the ad exposure and rating tasks was the likely cause of an ad type difference in purchase intention ratings.

3.3.4. Indirect ads were perceived as more original, surprising and intellectually challenging

The web survey data showed that indirect ads were perceived as more original, surprising and intellectually challenging than direct ads. These dimensions along with how interesting and typical to the product category the ads were rated were positively associated with the total viewing time independent of the ad type. Moreover, interpreting the meanings of the indirect ads was experienced as harder and slower than in direct ads. The participants had somewhat more difficulties in extracting the correct message from the indirect ads, although this effect was not significant. In many cases, the misinterpretation of indirect ads was explained by the visual layout. For example, an ad showed a mobile phone but the actual product being

advertised was a mobile subscription by an operator. In some cases, the visual conveyed multiple meanings and the participants were confused about the product or campaign that was being advertised. These findings were in accordance with our assumptions and previous research (Smith & Yang, 2004), which implies that creativity or originality in advertising involves divergence and relevance, that is, creative ads contain elements that are novel, different or unusual. Moreover, original ads deviate from the norm, are atypical for the product or brand and are experienced as unique and different from other ads (Elsen et al., 2016; Pieters et al., 2002).

Taken together, the survey results showed that our ad manipulations worked because elaboration of the meanings was harder and more challenging in indirect condition, replicating also earlier research (Jeong, 2008; Ketelaar et al., 2008; van Mulken et al., 2005). However, contrary to prior studies (Radach et al., 2003; van Mulken et al., 2005) and to our hypothesis, the ad types did not differ in liking, purchase intention, and how interesting or visual pleasant the participants rated the ads. Thus, the increased cognitive elaboration of indirect ads resulted into higher preference and purchase intention for the brands of indirect ads but did not affect liking or the aesthetic experience of the whole ads.

4. General Discussion

This study investigated whether consumers' attention, memory and preferences differ between indirect and direct ads. Indirect ads evoke more cognitive elaboration than direct ads because extracting their 'hidden' message requires processing (Jeong, 2008; Ketelaar et al., 2008; van Mulken et al., 2005). Based on previous literature (Pieters et al., 2002; Radach et al., 2003), we proposed that indirect ads would receive more attention than direct ads, which in turn would be associated with improved memory for the elements of indirect ads. Cognitive elaboration and the subsequent resolution are thought to be rewarding and fostering a positive and pleasurable experience (Topolinski & Reber, 2010). Based on these findings, we predicted that indirect brands would be preferred over direct brands. Moreover, we hypothesized that indirect ads would be perceived as more original and intellectually challenging and that they would be appreciated more than direct ads.

In two studies, we recorded participants' eye movements while they viewed direct and indirect ads. The instructions in both experiments led subjects to focus on the editorial texts, which

were irrelevant for the current study. Ad processing was, thus, investigated under incidental viewing with either fixed or free exposure duration. The free exposure condition in particular corresponds well with a typical magazine reading situation where the primary focus is on the text and the ads are secondary for the primary task.

Eye movement data from both experiments demonstrated that the pictorial elements of indirect ads were processed more extensively as indicated by more frequent fixations on the pictorials of indirect than direct ads. Further, the text received longer (Experiment 1) and more frequent fixations (Experiment 2) in indirect than in direct ads. These results confirmed our hypotheses of increased attention to indirect ads. The results further suggest that indirect advertising is an efficient strategy especially when the exposure time is sufficient for extracting the ad message. This conclusion is supported by the finding that indirect ads were viewed longer when viewing time was unlimited. However, data from both experiments indicated that the product information of direct ads was fixated more frequently. Contrary to prior studies (Pieters et al., 2002), the brand was fixated more often in direct ads (Experiment 1) and the time to fixate the brand from the ad onset was shorter in direct as compared with indirect ads (Experiment 2). These results were inconsistent with our hypothesis as they indicated enhanced processing of the product and brand information of direct ads. In line with previous findings (Elsen et al., 2016), the current results suggest that direct advertising may be more efficient when the exposure time is short, because these ads elicited shorter viewing times and were experienced as easier to interpret. Moreover, the results here showed that direct advertising benefits the processing of product and brand information.

Indirect and direct ads elicited different processing modes. In both experiments, the processing of indirect ads was characterized by longer saccades, which is indicative of an ambient attention mode (Pannasch et al., 2011) that allowed viewers to scan and integrate information over longer distances (Wyer et al., 2008). The focal attention mode, in turn, is characterized by short saccades accompanied by long fixation durations (Unema, 2005). The focal mode was more prevalent here when participants were viewing the direct ads especially when the viewing time was restricted. Eye movement analyses for the key elements of advertisements indicated that these attention modes were most prominent during the processing of ad pictorials. Across the experiments, the pictorials of indirect ads were processed in the ambient mode as suggested by frequent but short fixations (Pannasch et al., 2011). The ambient mode was applied to the indirect condition possibly because the pictorials were not very helpful for interpreting the ad

message or because the pictures required integration of information over long distances.

In accordance with our hypothesis, the brand logos of indirect ads were memorized and preferred over the logos of direct ads. Moreover, attention to brand logos and ads during initial exposure enhanced subsequent memory for both brands and ads, replicating previous findings (Pieters et al., 2002; Simola et al., 2013). Data from the online survey further confirmed that indirect ads were perceived as more original, surprising and intellectually challenging than direct ads, and that interpreting the meanings of the indirect ads was more difficult than in direct ads.

The total viewing duration was approximately 1.5 seconds longer when the viewing time was unrestricted compared to when the ads were shown for a fixed duration of five seconds. Part of the viewing time at the end of the free exposure condition was also spent on the decision to move on and on the subsequent manual response, while this was not required when the next stimulus was presented automatically. The viewing durations in both experiments exceeded the viewing time reported under normal viewing (*i.e.*, 2–4 seconds Ketelaar et al., 2008). A likely reason for the longer viewing time observed here under the free exposure, in comparison with normal viewing (Ketelaar et al., 2008), is the experimental setting which employed forced ad exposure. In real life situations, the ad exposure time may be even a single glance of a few seconds, while driving by billboards or paging through newspapers or magazines (Elsen et al., 2016). Such situations may additionally benefit direct advertising, because they require less processing time and because the product and brand information are more efficiently extracted from direct ads.

The viewing time difference between the experiments had important consequences for the viewing strategies. When viewing time was unlimited, participants were free to use a spontaneous strategy because they did not need to rush or adjust their viewing according to a time limitation. Interestingly, the viewing time manipulation and the subsequent differences in viewing strategies had the largest effects on the processing of the product and text information. When viewing time was unlimited, the texts were processed with longer and fewer fixations in the direct ads, suggesting a focal processing mode (Pannasch et al., 2011). Whereas, under limited exposure time, the fixation duration on the text was longer in the indirect ads. The product information elicited both frequent and longer fixations in direct ads when the viewing time was unrestricted, implicating that the product information of direct ads was more carefully

processed under the unlimited viewing time. Limited exposure, however, led participants to pay more careful attention to the text and product information in the indirect ads, as indicated by longer fixation duration on these elements. This was possibly because the indirect ads were harder to interpret and these elements were helpful for extracting the ad message when viewing time was limited. According to previous research (see Elsen et al., 2016), the product and brand that are being promoted form the basic identity of an ad. The text rather than the brand logo was possibly more informative for establishing the ad identity here, because the participants were unfamiliar with the brands. The exposure time manipulation, thus, affected the processing of ad elements that were important for establishing the ad's basic identity, whereby processing of the product and text information was enhanced in indirect ads when time was restricted and in direct ads when viewing time was unlimited.

The differences in processing of direct and indirect ads could be attributed to the differences in their content and meaning, because the direct and indirect advertisements were matched on the low-level stimulus features. We also confirmed that the ads were unfamiliar to the participant group: First, by selecting local ads and brands from countries that were geographically far from the region where this study took place. Second, we asked participants of Experiment 2 to rate the ads on familiarity. These ratings revealed that the participants were unfamiliar with the ads and brands used in this study.

4.5. Conclusions

At a practical level, this study corroborates the idea that indirect ads are experienced to be more original, surprising, intellectually challenging and harder to interpret than direct ads. Consequently, the indirect ads and especially their pictorial elements are viewed longer than direct ads, which are easier to interpret. The more extensive processing of indirect ads results into improved recognition and higher preference as well as purchase intention for the brands of in indirect ads. Thus, indirect advertising is an efficient strategy, but its benefits may be compromised if the meaning of an ad becomes too obscure to the extent that consumers are not able to extract the meaning or the identity of an ad.

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Appendix A

The table shows the questions asked in the online survey. The questions were followed by a presentation of an ad. The ads were shown in random order. The different response options were presented as radio buttons, only one of which could be selected. The numbers correspond to the scores used in the data analysis but were not visible in the survey. The same response scale was used for questions 4–10.

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1. Have you seen this ad before the eye-tracking experiment? (Familiarity)
    - 1 = never
    - 2 = rarely
    - 3 = sometimes
    - 4 = quite often
    - 5 = often
    - 6 = very often

2. Was it easy to understand what was being advertised? (Easiness of interpretation)
    - 1 = very easy
    - 2 = easy
    - 3 = quite easy
    - 4 = quite difficult
    - 5 = difficult
    - 6 = very difficult

3. Did it take long before you understood what was being advertised? (Duration of interpretation)
    - 1 = I understood it really fast.
    - 2 = I understood it fast.
    - 3 = I understood it quite fast.
    - 4 = It took quite long before I understood it.
    - 5 = It took long before I understood it.
    - 6 = It took very long before I understood it.

4. Did you like the ad? (Liking)
5. Was the ad interesting? (Interesting)
6. Was the ad visually pleasant / aesthetic? (Visually pleasant)
7. Was the ad intellectually challenging? (Intellectually challenging)
8. Was the ad original? (Originality)
9. Was the ad surprising? (Surprising)
10. Was the ad similar to the other ads of this product category? (Typical)
    - 1 = very little

2 = little

3 = not much

4 = somewhat

5 = a lot

6 = very much

11. Would you buy the product that was being advertised? (Purchase intention)

1 = very unlikely

2 = unlikely

3 = quite unlikely

4 = quite likely

5 = likely

6 = very likely

12. What was the product that was being advertised?

13. What else came to you mind when you saw the ad?

Appendix B.

Parameter estimate (B) and test of model effects (Wald Chi-Square, χ^2, and *p*-value) for the area of interest (AOI) size obtained from the General Estimated Equations (GEE) analysis for each AOI and eye movement measure. Bolded *p*-values indicate significant effects ($p < .05$).

	B	$\chi^2(1)$	*p*
Experiment 1			
Pictorial			
Number of fixations	0.009	323.09	**<.001**
Mean fixation duration	2.26E-6	1.79	.181
Time to first fixation[1] (ms)	2.00E-5	31.68	**<.001**
Brand logo			
Number of fixations	0.077	54.57	**1.50E-13**
Mean fixation duration	4.44E-5	3.40	.065
Time to first fixation	2.61E-5	12.74	**3.58E-4**
Product			
Number of fixations	0.036	1278.55	**<.001**
Mean fixation duration	1.18E-6	0.18	.672
Time to first fixation	3.59E-5	90.23	**<.001**
Text			
Number of fixations	0.138	320.81	**<.001**
Mean fixation duration	0.000	110.66	**<.001**
Time to first fixation	5.54E-5	62.52	**2.66E-15**
Experiment 2			
Pictorial			
Number of fixations	0.009	123.22	**<.001**
Mean fixation duration	-0.002	65.45	**5.55E-16**
Time to first fixation[1] (ms)	-0.046	90.96	**<.001**
Brand logo			
Number of fixations	.516	1431.79	**<.001**
Mean fixation duration	-0.050	28.48	**9.49E-8**

Time to first fixation	-.0.134	37.36	**9.84E-10**
Product			
Number of fixations	.037	250.72	**<.001**
Mean fixation duration	0.001	0.90	.343
Time to first fixation	-0.130	792.24	**<.001**
Text			
Number of fixations	.218	444.54	**<.001**
Mean fixation duration	-.015	18.34	**1.80E-5**
Time to first fixation	-0.139	208.60	**<.001**

[1]The time to fixate an AOI was calculated from only those ads which contained the specific AOI and in which the AOI was fixated at least once.