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The Effect of Gaze Cues on Attention to Print Advertisements

S. B. HUTTON* and S. NOLTE

University of Sussex, UK

Summary: Print advertisements often employ images of humans whose gaze may be focussed on an object or region within the advertisement. Gaze cues are powerful factors in determining the focus of our attention, but there have been no systematic studies exploring the impact of gaze cues on attention to print advertisements. We tracked participants' eyes whilst they read an on-screen magazine containing advertisements in which the model either looked at the product being advertised or towards the viewer. When the model's gaze was directed at the product, participants spent longer looking at the product, the brand logo and the rest of the advertisement compared to when the model's gaze was directed towards the viewer. These results demonstrate that the focus of reader's attention can be readily manipulated by gaze cues provided by models in advertisements, and that these influences go beyond simply drawing attention to the cued area of the advertisement. Copyright © 2011 John Wiley & Sons, Ltd.

INTRODUCTION

The advertising maxim 'unseen is unsold' reflects the received wisdom that, in print advertising at least, it is necessary to attract the attention of the viewer in order for an advertisement to have a chance of being effective. Furthermore, even if an advertisement does manage to attract a viewer's attention, it must also be adequately branded—even the most attention grabbing advertisement will not be effective if it does not build associations with a specific product or brand (see Keller & Lehman, 2006). According to Du Plessis (2008), 18% of participants who were given descriptions of advertisements claimed to remember an advertisement, but could not remember the brand it was advertising. A further 12% of the sample remembered an advertisement when given a description, but named the wrong brand. In other words, if an advertisement's branding is ineffective, then successfully attracting a viewer's attention may only result in a rival product being promoted.

Given the importance of both attracting attention, and ensuring it is directed at the relevant information within an advertisement, it is perhaps surprising how few scientific studies have attempted to determine how attention is allocated to print advertisements, or establish which features of advertisements receive most attention. Visual acuity falls away dramatically with increase in distance from the fovea, and as a result we typically make 2–3 saccadic eye movements per second in order to re-orient the fovea onto a different region of the visual field (see Rayner, 1998). We only truly 'see' during the fixation period between saccades when the retinal image remains still enough to be processed. The duration and location of fixations thus reflect, in a reasonably transparent way, which aspects of a visual scene are overtly attended. Importantly, a number of studies have demonstrated clear links between which objects within a scene have been fixated, and which objects are subsequently remembered (e.g. Irwin & Zelinsky, 2002). Wedel and Pieters (2000) used eye tracking technology to establish, in a very large sample, that people reading magazines (presented on a computer screen) spend less than 3 seconds looking at each advertisement contained within those magazines. Furthermore, they found that the brand element of advertisements drew a disproportionate amount of attention compared to the pictorial and text elements, despite its comparatively small surface area. In another large-scale eye tracking study Pieters, Wedel, and Batra (2010) found that increased design complexity (the intricacy of the creative design) was associated with increased attention to advertisements, as opposed to visual complexity (defined as the density of visual detail in terms of colour, luminance and edges), which actually had the opposite effect. Rayner, Rotello, Stewart, Keir, and Duffy (2001) found that participants spent more time attending to the text compared to the pictorial part of advertisements. The dominance of the textual component of advertisements in this study is likely due to the fact that participants were given a series of advertisements to view one at a time—they were not embedded within a magazine and thus were not competing with other information for the viewers' attention. In addition, the participants were instructed to view the advertisements as if they were planning to purchase the products being advertised—an orienting instruction that will have increased the likelihood that participants sought out product information contained in the text.

In a follow up study, Rayner, Miller, and Rotello (2008) showed that the goal of the viewer can have a considerable impact on how advertisements are viewed. Participants who were asked to rate the effectiveness of an advertisement or how much they liked the advertisement looked more at the pictorial content of the advertisement and less at the text content than participants in their earlier study who had been asked to consider purchasing the products depicted in the advertisements.

Together these studies demonstrate that a range of factors can impact on how attention is allocated to advertisements, but few other well-designed studies have been published in this area, and differences in methodology make it difficult to make cross-study comparisons and draw firm conclusions. Wedel and Pieters (2007) provide a thorough review of what little other research has been done in this area (much of it by their own group), and conclude that research is urgently

*Correspondence to: Dr S. B. Hutton, School of Psychology, University of Sussex, Brighton BN1 9QH, UK. E-mail: s.b.hutton@sussex.ac.uk

needed into a number of issues, including how natural objects such as people and faces in advertisements effect attention.

The human brain possesses highly specialized neural systems for processing faces (see Tsao & Livingston, 2008, for a review). These systems have presumably developed because our ability to 'read' faces is critical for effective social interaction (Emery, 2000). Faces have been shown to capture attention more readily than other stimuli (e.g. Langton, O'Donnell, Riby, & Ballantyne, 2008) suggesting they might serve as a useful means with which to attract attention towards an advertisement. Given the critical role eyes play in portraying emotion, identity, and the direction of attention, it has been argued that this region of faces is particularly important for social cognition (Itier & Batty, 2009). Functional neuroimaging studies have identified regions in the superior temporal sulcus of the human brain that contain neurons which respond selectively to different eye gaze directions (Cloutier, Turk, & Macrae, 2008), and behavioural research has shown that we are highly efficient at determining the direction of gaze, from both the orientation of the eyes (e.g. Gamer & Hecht, 2007), and other cues such as orientation of the head and trunk (e.g. Langton, 2000).

Not only are we able to rapidly and accurately detect the direction of gaze in others, numerous studies have demonstrated the power of gaze cues to orient the focus of our own attention. For example, infants as young as 3–6 months old have been found to make saccades in the same direction as eye gaze cues (Hood, Willen, and Driver, 1998). In a simple reaction time task, Driver, Davis, Ricciardelli, Kidd, Maxwell, & Baron-Cohen (1999) found that adults are faster to detect targets that appeared on the same side of the screen to which the eyes of a centrally positioned face are oriented compared to targets that appeared on the side away from the gaze direction. Some research suggests that gaze cues are more powerful at triggering shifts of attention than other centrally presented stimuli such as arrows (Ricciardelli, Bricolo, Aglioti, & Chelazzi, 2002), although more recent research has found equivalent effects (e.g. Kuhn & Benson, 2007). The relative efficacy of faces and arrows in cueing a viewer's attention was explored in recent study using naturalistic complex scenes (Birmingham, Biscof, & Kingstone, 2009). The study showed that in this more naturalistic context people have a profound preference to look at eyes rather than arrows. Together these findings suggest that the gaze direction of models in advertisements could have a profound impact on viewers' attention towards those advertisements.

Despite the ubiquity of faces in print advertisements, and the importance of attention in determining an advertisement's effectiveness (see e.g. Sacharin, 2000; Wedel & Pieters, 2007) there appears to have been no systematic study of the effect of gaze cues in print advertisements. Indeed, in contrast to the large number of studies that have investigated the effect of gaze cues using various types of facial stimuli, there have been very few studies looking at the effect of gaze cues on attention in more naturalistic contexts. In one recent study Zwickel and Võ (2010) demonstrated that the orientation of the heads and trunks of people within a naturalistic visual scene (from which gaze direction could be inferred) was sufficient to cue participants' attention to specific objects within that scene. Objects that were the focus of gaze of the model in the scene were looked at sooner, more often, and for longer than equivalent objects that were not the focus of gaze. Using a change blindness task, Langton, O'Donnell, Riby, and Ballantyne (2006) showed that participants were quicker to detect a change in a natural scene if the object that changed was the focus of gaze for an individual also appearing in the scene. Kuhn, Tatler, and Cole (2009) demonstrated that magicians are able to use gaze cues to manipulate the focus of attention of their audience. Together these studies suggest that perceived gaze direction can orient the attention of the viewer, but their potential to act as attentional cues in print advertisements is not known.

In the present study we used eye tracking to determine the extent to which the gaze direction of models in simple advertisements impacted on the gaze pattern of people viewing the advertisements. Models within the advertisements either looked towards the product being advertised, or outwards, towards the viewer. If participants are simply presented with a sequence of advertisements to view, the issue arises as to what instructions they should be given whilst viewing them—as Rayner et al. (2008) have shown, the goal of the viewer can impact on how advertisements are viewed. In order to approximate natural viewing behaviour as closely as possible, the advertisements in the present study were embedded within an on-screen magazine that participants were instructed to browse, as if they had picked the magazine up in a waiting room. Based on the research described above we predicted that participants would look longer at the product if it was the focus of the model's gaze than if it was not.

METHOD

Participants

Thirty-two participants (16 male, 16 female) between the ages of 20 and 29 ($M = 21.4$) were recruited from the University of Sussex. Participants volunteered to take part in the study without any incentive or pay. All provided written consent and were informed that they could withdraw from the study at any point. The study was approved by the relevant Research Governance Committee.

Materials

Two versions of 16 different simple advertisements were created. Each advertisement comprised a model (models were all unpaid students from the University of Sussex) wearing or holding a product (such as a watch or a bottle of perfume) and a brand logo, all set against a neutral background (see Figure 1 for an example). In one version of the advertisement the model was gazing at the product, and in the other the model directed their gaze directly at the camera. Given previous research indicating that the focus of gaze can be accurately determined from trunk and head orientation as well as eye position, both cues were used.

Figure 1. An illustrative example of mock advertisements used in the magazine. Gaze towards product (left); gaze towards viewer (right). White squares indicate product and brand regions of interest (ROIs)

Facial expressions were kept neutral to control for possible effects of emotion, and the brand logos were always placed in the bottom right hand corner and resized so that they occupied an equivalent area across advertisements.

These advertisements were placed into one of two 'on-screen magazines'. Each double page of these magazines comprised two A4 size magazine pages. One half of each double page contained a short magazine article or feature, whilst the other half contained one of the advertisements. An equal number of advertisements appeared on the left and right hand sides of the double pages.

Design

By creating two different versions of each advertisement (one with the model gazing at the product, one with the model gazing straight ahead) we were able to minimize the potentially confounding effects of the model themselves—for example some models may simply have been more attention grabbing than others. In order to ensure that participants did not see the two versions of any one advertisement (which may have resulted in an artificial increase in attention), we created two versions of the on-screen magazine—referred to as Magazine A and Magazine B. Each magazine contained the same filler articles and 16 of the advertisements. In each magazine half of the advertisements were with the model looking ahead and half with the model looking towards the product. Magazine B contained the alternate version of each advertisement in Magazine A, reversing whether the model was looking down or towards the product. Half the participants (16 of 32) viewed Magazine A, and the other half viewed Magazine B. Thus, the overall design was mixed, with all participants viewing advertisements in which the model gazed towards the product or out of the page towards the viewer (within subjects factor of gaze direction) and half the participants viewing Magazine A and half Magazine B (between subjects).

Procedure

The magazines were presented on a 21″ CRT monitor. Eye movements were recorded using an Eyelink II eye tracker (SR-Research, Ontario). This involved the participant wearing a lightweight headset containing two miniature cameras which recorded gaze position 500 times a second. The experiment began with a brief calibration procedure, which required the participants to fixate nine small circles located in a 3×3 grid on screen. This was followed by a validation procedure, in which the same nine positions were fixated again. If the average spatial error was less than 1.0 degree the calibration was accepted. Participants were then told to imagine they were in a waiting room and had up to 10 minutes to browse through an on screen magazine. Pages were turned by pressing the right or left arrow keys on the keyboard, and participants were allowed to return to any of the pages if they so desired. The eye tracking began when the participant pressed the spacebar to begin. In between each page turn a brief drift correction procedure was performed in order maintain the spatial accuracy of the eye movement recording. No participants withdrew from the study, and all were fully debriefed upon the completion of the study.

Gaze analysis

Regions of interest (ROIs) were created for each of the advertisements and comprised the whole advertisement (e.g. the left or right half of each double page), the product, and the brand logo. All ROIs were rectangular. The boundaries of the ROI surrounding the products were 'loose fitting' in that the products were not rectangular, so the product ROI could include non-product information (for example parts of the model's arm and hand as in Figure 1). As the product ROIs

were the same size for each of the two versions of the advertisement there were no systematic differences in ROI area or content that could impact on dwell times differentially for the two versions of each advertisement.

The internal eye movement-parsing algorithm used by the Eyelink system defines fixations as any period that is not either a saccade or a blink. Blinks are defined as periods in which the pupil signal is missing for 3 or more samples and saccades are defined as periods in which either the instantaneous velocity exceeds 30 degs/second or instantaneous acceleration exceeds 8000 degs/second/second. For each ROI we examined total dwell time (the sum of the durations of all fixations in that region), the number of fixations and the number of 'entries' (separate visits to an ROI). Analysis of the fixation and entry count data revealed very similar effects as the dwell time data, so are not presented here or discussed further. The data were pre-processed in Microsoft Excel to calculate total dwell time and other measures across trials for each participant, as a function of gaze direction, region of interest and magazine. The resulting values analysed with SPSS Version 16.

RESULTS

On average, participants spent a total of 385 seconds reading the on screen magazines. The average amount of time spent looking at advertisements was 54 seconds (3.4 seconds per advertisement). In other words 14% of the time taken reading the on-screen magazine was spent looking at advertisements, despite the fact that, in our magazines, they made up 50% of the content.

In order to determine whether the model's gaze direction influenced the way in which participants allocated attention to the advertisements, a $2 \times 2 \times 2$ mixed analysis of variance (ANOVA) was performed, with dwell time (the sum of the duration of all fixations in a region of interest) as the dependent variable and the within subjects factors of gaze direction (towards the viewer *vs*. towards the product), and ROI (product *vs*. brand) and the between subjects factor of magazine (magazine A *vs*. magazine B). The main effect of gaze direction was significant $F(1,30) = 6.9$, $p < 0.02$. As is clear from Figure 2, participants looked to both the product and brand regions of interest for longer when the model was looking at the product compared to when they were looking out at the viewer. The main effect of region of interest (ROI) was also significant, $F(1,30) = 13.546$, $p < 0.001$. On average, participants spent longer viewing the product in the advertisement than the brand. This is unsurprising as the product ROI generally occupied a larger area than the brand ROI. There was no effect of the between-subjects factor magazine type. (F $(1,30) = 0.34$), nor did it interact with the other factors (all Fs < 1.5) suggesting that the main effects were not due to differences in advertisements between the magazines.

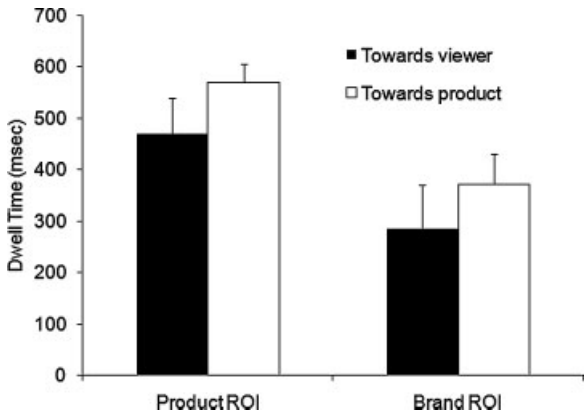

Figure 2. Average dwell time (milliseconds) for product and brand regions of interest as a function of the models gaze direction (towards viewer *vs*. towards product)

The finding that participants spent longer looking at the brand ROI as well as the product ROI when the model's gaze was directed towards the product was somewhat unexpected—we had predicted that the model's gaze would cue participants attention to the product, but it appears that having attracted attention to the product, viewers were then also more likely to view the brand information. In order to determine whether participants' gaze patterns towards the advertisement as a whole (not just specific regions within the advertisement) differed as a function of whether the model was gazing at them or towards the product, a mixed ANOVA was conducted on participants' average dwell times to the whole advertisement ROI minus dwell times to the product and brand ROIs. Again, the main effect of gaze direction was significant ($F(1,30) = 7.4$, $p < 0.02$) whereas the effect of magazine and magazine by gaze direction interaction were not significant (Fs < 1) demonstrating that participants spent longer looking at all aspects of the advertisement when the model's gaze was directed towards the product. The analyses above were rerun, with participant sex included as a between participants factor. There were no main effects of sex, nor did sex interact with any of the other factors (all Fs < 1.8).

In order to establish whether the increase in dwell time to the product ROI was a direct consequence of the model's gaze direction, we ran a fixation sequence analysis. For each advertisement a further ROI was created which comprised the model's face. We then established the number of fixations to the product ROI that resulted from saccades from the face ROI. In other words the number of times for each advertisement participants fixated the model's face, and then immediately fixated the object of that model's gaze. On average participants made significantly more fixations to the product region from the model's face region when the model's gaze was directed towards the product than when the model's gaze was directed outwards (6.5 *vs*. 4.4, $t(31) = 2.7$, $p < 0.05$).

DISCUSSION

In the present experiment we used eye tracking to compare the effect of models' gaze direction on viewers attention to advertisements using a naturalistic 'on-screen magazine' technique (*cf*. Wedel & Pieters, 2002; Pieters, Wedel, & Batra, 2010). Two key findings emerged from the present study. Firstly, as predicted, participants spent longer looking at the product region of the advertisement when the model's gaze was directed at this region, and were more likely to fixate the product having first fixated the model's

face. Secondly, participants also looked longer at the brand region of the advertisement as well as the entire advertisement itself when the model's gaze was directed towards the product rather than out of the image.

The finding that participants looked longer at the product when the model's gaze was oriented in that direction supports the large body of previous research demonstrating that gaze cues can be powerful stimuli in the orienting of attention. The vast majority of these studies have used eye direction as the sole cue to gaze—typically employing front facing photographs or images in which only the eyes change orientation. In everyday life, however, the orientation of people's head and trunk can also provide important information concerning the location of gaze (Itier & Batty, 2009; Langton, 2000). The present results add to the comparatively small number of studies that have shown that gaze cues in more naturalistic contexts are still highly effective at orienting viewers' attention.

The finding that people also looked longer at the brand region, and indeed the advertisement as a whole when the model's gaze was directed towards the product was somewhat unexpected. One possibility is that once attention has been drawn sufficiently to the product, the viewer's curiosity for further information is sparked, leading them to search for the brand name, and explore other aspects of the advertisement in slightly more detail than they would have if they had not been drawn to the product in the first place. Pieters, Wedel, and Batra (2010) noted a similar effect for design complexity—increase in complexity improved attention to both the pictorial element of the advertisement, and to the advertisement as a whole. These findings have important implications for advertisers, because they suggest that comparatively simple changes in design can have 'carry over' effects which increase attention to all aspects of the advertisement. A (speculative) alternative hypothesis is that people find direct eye contact somewhat aversive. In other words, rather than gaze directed towards the product increasing attention to the advertisement, the direct gaze in fact reduced it. Coss, Marks, and Ramakrishnan (2002) argue that staring is perceived as an aggressive act in a large number of primate species, including humans, and Nichols and Champness (1971) found that prolonged eye contact between humans was perceived as aggressive and to led to increased galvanic skin response compared to averted eye gaze. Further research using control advertisements in which gaze is directed at neither the product nor the viewer will be required in order to determine whether gaze to the product resulted in a comparative increase in attention to direct gaze resulted in a comparative decrease.

The advertisements were viewed for approximately 3.5 seconds on average, which is slightly longer than the average time of 2.1 seconds reported by Wedel and Pieters (2000), using a similar on screen magazine methodology but with genuine advertisements. Real print advertisements obviously differ greatly in countless factors such as the colours used, the product being advertised, the amount and font size of any text employed and the size, shape and prominence of the brand logo used. In order to avoid the potentially confounding effects of variables such as these on eye movements, the images used in the present study were produced so that they followed the stylistic convention of a simple advertisement, containing a model, a product and a logo on a simple background. Whilst this approach allowed a high degree of control over the perceptual properties of the advertisements, the resulting advertisements appeared rather artificial, and clearly only represented a certain 'type' of advertisement. We also used single page filler articles which may have been somewhat less interesting than the non-advertisement content of the magazines used in the Wedel and Pieters (2000) study. Further research using genuine advertisements, or employing a wider range of advertising styles and products would help extend the present findings, and determine the extent to which the effect of gaze cues can be moderated by such factors (although see Rayner et al., 2008 for some discussion on the relative disadvantages of this approach).

Reference is not given in the list. Please provide it in the reference list. Bayliss, di Pelligrino, and Tipper (2005) found that the ability of gazecues to promote reflexive shifts in attention was diminished in males compared to females. We did not find any effects of participant sex in the present sample, but this was not the focus of the investigation, and it is possible that such effects may have emerged in a larger sample, or with advertisements that employed both male and female models (and products relevant to both male and female readers). The sex of the model employed in the advertisement may be relevant both in its own right, and in its potential to interact with the sex of the viewer. For example, male participants have been found to rate the direct gaze of female faces as attractive, whereas this was not the case for female participants (Mason, Tatkow, & Macrae, 2005). The present study also did not address broader practical issues such as whether the differences in attention to the advertisement prompted by the model's gaze cues had any effect on critical metrics such as advertisement liking, advertisement recall, or intention to purchase. Clearly, further research employing these measures, along with a wider range of products and a larger sample would help elucidate some of these issues.

In conclusion, the results of the current study show that diverting a model's gaze in advertisement can be used to not only attract, but to increase the viewer's attention to the product, brand and the advertisement as a whole. These results have implications for the design of print advertisements containing faces and suggest that advertisement designers could use gaze cues to direct readers' attention to salient information within their advertisements.

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