Visual Effects of Logo on the Attentional Filter and Perception

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Purpose

In cluttered market spaces, marketers are challenged to gain the attention of consumers. Logos are one of the main instruments to communicate image, gain attention and differentiation from competition (Henderson & Cote, 1998; MacInnis et al, 1999; Pittard et al., 2007). Moreover, logos may have an important impact on customer commitment, as well on firm performance (Park et al., 2013). Not surprisingly, companies spend a significant amount of time and money creating logos in order to perpetuate an image which they think is congruent with their brand image (Spaeth, 1999). However, humans have limited cognitive capacity and thus, some information will not reach conscious perception (Broadbent, 1958). Due to the limited capacity of cognitive resources, human attention uses a "filter", in order to allocate attention. (Broadbent, 1958). Broadbent describes this model as the "Filter model of attention". According to this model, certain features of objects are unconsciously processed at a basic level, including colour, pitch, loudness, and direction. Semantic features (such as meaning), on the other hand, are not processed in this initial stage of processing, but require focused attention at a later stage. Based on these basic features, some stimuli become attended, while other stimuli never receive attention and are unattended. Attended stimuli then receive additional processing at a conscious level. Binocular rivalry and binocular suppression are two ways that can be used to determine the specific visual elements of a display that help it break through the attentional filter and reach consciousness. In a typical binocular rivalry task, one image is presented in one eye (e.g., the left) and completely different image is presented in the other eye (e.g., the right). Since such a binocular rivalry situation is rarely experienced, the human processing system does not quite know what to do

with the information presented in this situation. Thus, a compromise of sorts is achieved with the image in one eye perceived for a brief time and then the image in the other eye will be perceived for a time. Perception then alternates between the images in the two eyes. The length of time one image is perceived compared with the length of time that another image is perceived provides a measure of perceptual dominance and the visual elements that contribute to such perceptual dominance are subject to scientific study.

The purpose of this project is to understand the effects of different logo design elements (i.e. spatial frequency, contrast sensitivity, and colour) to assess their effectiveness at gaining the attention of consumers. The propensity of elemental changes to break through the attentional filter is expected to provide insight into the decisions made about brand logo design to improve the likelihood that a logo can gain attention in a busy market or communication channel.

Methodology

We hypothesize that logo designs with higher spatial frequencies, greater contrast and brighter colours will break from binocular suppression significantly faster than logos designed with lower spatial frequencies and lower contrast. We expect this effect to be amplified within the older adults.

In this experiment, only those participants are included with normal or corrected to normal visual acuity (i.e., 20/30 or better according to their performance on a Snellen eye chart). The methodology employed is similar to what other researchers have done to examine binocular rivalry (Ooi & He, 1999; Parker & Alais, 2007). Each participant performs the task in a dimly lit sound attenuating chamber by viewing stimuli presented on the computer screen through a mirror stereoscope. The mirror stereoscope allows the presentation of a portion of the screen to one eye and another portion of the screen to the other eye. As binocular disparity (i.e., the distance between the left and right eye) varies for each individual, adjustments to the stereoscope will be made on a case by case basis.

In this research, we use a binocular suppression paradigm to assess the brand elements of spatial frequency, contrast sensitivity, and colour influence on attention based on logos selected from the Machado et al. (2015) study on logo design (2015). In this binocular suppression paradigm, a masking stimulus (in this case a pseudo Mondrian image) will be presented in one eye while a second image (target stimulus logo) will gradually appear in the other eye. Perceptually, what this results in is the full perception of the masking stimulus presented immediately in the one eye until the stimulus presented in the other eye is of sufficient contrast to break the dominance of the masking stimulus and be perceived. The amount of time required to identify the location of the target stimulus is our measure of the time required to break through the attentional filter and is expected to vary according to spatial frequency, contrast sensitivity, and colour of the target stimulus logo (going from 0% contrast to 100% contrast over the course of 1 second). After reaching 100% contrast the image remains on the screen for 5000 ms or until the correct key on the 4-button box is pressed by the participant. The computer measures and keeps track of reaction times.

Findings

We are currently conducting the experiments and will present our findings at the conference. Specifically, we hypothesize that logo designs with lower spatial frequencies and greater contrast will break from binocular suppression significantly faster than logos designed with

higher spatial frequencies and lower contrast. However, we expect this effect to be less apparent within the older adult group. We expect the difference in the time required for a logo to break from binocular suppression will be even longer among older adults when these designs have either high spatial frequencies or are low in contrast due to the decline in spatial selectivity and contrast sensitivity. We expect to see differences in all age groups for spatial frequency and contrast, but we expect to see the largest differences within the older group. We also hypothesize that brighter colours will also break from binocular suppression significantly faster than duller colours. Again, we expect this effect to be amplified in older adults.

Theoretical Implications

This study examines three factors which can help explain the penetration of the attentional filter which have not been examined for brand logos – contrast, spatial frequency, and colour. One aspect of a stimulus that may influence how easily it is processed or how quickly it might break free from binocular suppression and reach consciousness is the contrast within the stimulus. Spatial frequency is used to describe the density of a pattern, while contrast describes the difference between light and dark in the stimulus. It is possible that contrast and spatial frequency could influence the speed with which a stimulus breaks free from binocular suppression and could differ according to age group. Glass (2007) gave participants a series of tests that ranged from low perceptual processing demand to high perceptual processing demand, and also measured participants' sensitivity to contrast. Glass found that contrast sensitivity is more highly correlated with tasks that have higher sensory processing demands and this contrast sensitivity is responsible for the age-related variance in these tasks. This is to be expected, as contrast sensitivity decreases as one ages. Furthermore, Previous research on visual attention has revealed that attention can increase the contrast of a visual pattern which increases how long the stimulus presented in one eye is dominant (i.e., is being perceived and is the only stimulus visible during dominance durations --Carrasco, Ling, and Read, 2004; Lu & Dosher, 1998). Endogenous attention may increase the dominance duration of the attended stimulus by increasing its apparent contrast. The role of contrast is significant, as attention is also thought to boost contrast of the stimulus, and increase its chances to become dominant.

Additionally, the ability to perceive spatial frequency (i.e., visual acuity, or the ability to detect edges of lines) declines as people age (Scheiber, Kline, & Fozard, 1992). Owsley and Sloane (1987) used contrast sensitivity and spatial frequency to determine whether or not changes in these factors would impact the perception of objects seen in everyday life (faces, road signs, common objects). Contrast thresholds were measured for visual grating stimuli as well as the everyday life stimuli. Their results suggest that age and middle to low spatial frequencies are the best predictors of thresholds for real-world targets. This indicates that spatial frequency and contrast sensitivity are able to predict how well individuals are able to perceive everyday or real world targets. These studies would suggest that contrast sensitivity and spatial frequency are factors which must be considered when attempting to determine stimulus perceivability.

While spatial frequency and contrast sensitivity are factors that may influence the way an individual processes images such as logos, colour may also play a very important role. Indeed, many studies have shown that colour can evoke emotional and physiological responses (Guilford, 1934; Leichsenring, 2004; Valdez & Mehrabian, 1994;), and that color is a critical component of brand communications cues, particularly of logos (Hynes, 2009; Madden et al, 2000; Schmitt & Pan, 1994). Colour can also be used in advertisements to capture a readers' attention (Fernandez & Rosen, 2000).

Practical Implications
In a cluttered marketplace where consumers are exposed to virtually endless persuasion attempts, it would be valuable to understand how a brand logo can gain attention and, therefore, cognitive elaboration. Identifying elements which are positively related to attention and elaboration could lead to more effective logo designs for marketers.

Limitations
Given the experimental design of this study, it is important to note that the laboratory environment may not accurately mimic the exposure and processing of brand logo stimuli in the marketplace. However, experimental research does give us powerful insight into causal relationships among the variables studied to gain a better understanding of logo design elements which are more effective. Future research should also conduct testing in other countries to ensure that the observed effects are not cultural artifacts.

Originality/Value
This research employs a unique methodology to deepen our understanding of how marketers can gain attention in a cluttered marketplace. In addition, the research helps by identifying the role of logo spatial frequency, contrast and colour in the effectiveness of gaining attention.

Keywords: Brand Logo; Logo Design; Attention; Perception; Binocular Suppression

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