

AESTHETIC EVALUATION OF LOGOS USING BIRKHOFF'S THEOREM

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ABSTRACT

A Logo is an important part of brand identity and helps in achieving immediate recall for the brand. A logo can communicate brand attitude, brand value and even brand strengths. A logo can determine the age of a brand, people can perceive a brand to be in-trend or old based on its logo, ageing brands hence often use logos as a form of brand rejuvenation. Logo designing and keeping it up-to-date is hence of high priority for brand managers. Literature tells us that updated or revamped logos does have a positive bearing on the customers, but studies are scant on how to rejuvenate logos. This study aims to fill this gap by establishing an absolute art measure from Birkhoff's aesthetic measure. The purpose of this study is to construct an aesthetic evaluation criteria for corporate logos using Birkhoff's Theorem. The study will hence attempt to test respondents' recall, affect and preference of the logos of varying Birkhoff's values (high-low).

INTRODUCTION

Companies spend a lot of time and money in brand building activities and communicating its values to consumers. Every such value gets associated with a symbol in the consumer's mind. Ideally, every brand would want a strong value association with a single symbol, its logo. Research on branding notes that aesthetics of brand logos expressively impacts customer responses. In today's world where humans have strong visual orientation and where every communication medium is cluttered with different symbols, it becomes essential for a brand to have a logo with high recall. Even with companies investing large amounts of money in changing and updating their logos, studies on logo design and modifications are rare. This research hopes to fill this gap by introducing Birkhoff's Theorem into designing of logos, which provides a formal aesthetic evaluation method valid without regard to artistic style paradigms. This research is done to study the recall, affective responses and preferences generated from a logo designed using Birkhoff's Theorem, and establish an absolute art measure which can be used by companies in brand evolution or rebranding. 15 logos were identified for this purpose. Each logo has a different Birkhoff value. Independent experiments were conducted to measure recall, affect and preference of the 15 logos.

LITERATURE REVIEW

A logo is a graphic design or a symbol used to identify and recognize a brand (a company or a product). The design may or may not include the company name. (Müller, Kocher, & Crettaz, 2013). A logo can be a symbol, a trademark, design which forms the identity of a company (both personal and business). Logo is an essential symbol used in every brand communication activity performed by the company, for any and all stakeholders. It is the most critical visual communication tool a company owns. It is often suggested that a good, well-suited corporate logo can enhance a corporate image. Authors have argued a logo can create "measurable images" in the mind of stakeholders/ consumers thus functioning as a stimulus of brand identity and brand imagery. Thus, a suitable logo must be used by the company to project desired image of company to its consumers and stakeholders (Van Heerden & Puth, 1995)

A logo being the key identity tool of the brand, it is used in every brand communication and promotion activity that a company undertakes. Hence, a logo is attached with multiple brand messages or themes communicated in these activities. The consumer interaction or experience with the brand (good or bad) also gets associated with the logo. Thus, it is important for a company to use the same logo in every brand communication. Even if brand expands across a nation's border logo must be maintained (Henderson et al., 2003; de Mooij, 2005). Extant literature also often compare brands to human beings, attributing human form and personality to brands. Thus, were created the concepts of brand personality, brand relationships etc. Existing literature have compared brand and human life cycles suggesting that even brands age with time and need a visual 'elixir' to invigorate them (Müller, Kocher, & Crettaz, 2013). These works of literature confirm the common culture among corporates to rejuvenate their logos (make minor aesthetic changes or create an entirely new logo), hence explaining how logos can "anthropomorphize" brands. Logo changes or updating can affect logo attitudes and translate this changed attitude into brand modernity to communicate with the new younger consumer segment while maintaining conversations with the loyalists.

This means that managers need to be careful while changing or rejuvenating logos. Research does argue that revamped logos can have a positive bearing on the consumers, but it does not explain how much of change is to be made, or how to incorporate these changes. Rejuvenating or revamping should be done in the right amount, too much change can break down the image the brand has built in the consumers mind over the past years, on the contrary if the change is too less the consumers might fail to notice the objective, that is to create an up-to-date logo. So, rejuvenating logos is of high priority to brand managers, and in spite of the importance of logo designing in brand management and communication, there haven't been many studies on it. Relevant studies are limited to Golden ratio, and qualitative variables such as harmony, design richness, elaboration and other creative style templates, all of which have never been incorporated into any kind of parameters, or been verified. So, selecting and redesigning logos are done by an individual's personal views and interpretations of what a good logo looks like.

For a logo to be good, it should be recognizable, generate positive affect and should have good preference among the audience. Recognition is a much-preferred attribute in logos as company interactions last only for a short time and a recognizable logo can accelerate company name and image. Literature also tells us that when customers are able to recall a logo, they also remember the associated content, like the name of the company or a tag line. We can say that a logo has received correct recognition if customers have managed to recall the logo which they had been shown before. Another variable that plays a vital role is affect, positive affect can be passed on from a logo to the brand. Affect can be defined as the "emotional reaction" produced by the logo.

Aesthetics is defined as "the branch of philosophy concerned with the nature and appreciation of art, beauty and good taste". But is there a way to construct a formal structure of measuring aesthetics of an object, which is not dependent on qualitative variables of art and style. Can an "absolute art measure" be constructed? The first step to answer this question of evaluating art using a pre-defined apparatus was done by George D Birkhoff, a mathematician. Birkhoff suggested that aesthetics of art can be measured using Order and Complexity, he proposed a theory which combines these two gauges (Order and Complexity)

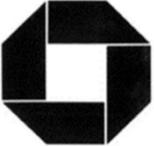
Order (O) is defined as the property of an aesthetic object which corresponds to any association
The complexity (C) of a polygon is defined as the number of indefinitely extended straight lines which contain all the sides of the polygon

"Birkhoff's aesthetic measure" (M) is given by:

$$M = O / C$$

Selecting Logos: The logos used in this study were selected from a book titled Trademarks and Symbols Kuwayama 1973. The following were the logos used and their Birkhoff's values are written next to them.

Logo	Birkhoff's value
	0.35
	0.25
	0.25
	0.20
	0.25
	0.31
	0.40
	0.21

	0.17
	0.1
	0.14
	0.16
	0.16
	0.22
	0.08

HYPOTHESES

The objective of this study is to test if logos designed adhering to Birkoff's theorem be high on affective responses and better preferred. The study will hence attempt to test respondents' preference of the logos of varying Birkoff values (high-low). It is known through literature that a logo is something that is used by a company to distinguish themselves from others and that overtime logos are changed to rejuvenate brand image (Müller, Kocher, & Crettaz, 2013). Existing literature also state that design of the logo should be "distinctive and memorable" so as to connect with the consumers and create correct recognition in their minds. Further existing literature also establishes distinction between logos that are representative of objects and abstract logos. Representative logos

are natural logos which is familiar to the viewers, studies say that they can generate more positive affect and recognition than abstract logos. Largely, most studies on logo design and aesthetics stresses on the significance of logo design that stimulate brand's recognition and perception. Aesthetic studies often use pleasure and arousal as measurement of such stimulus and hence in this study I will attempt to test the impact of logos the pleasure and arousal that Birkoff theorem adhering logos can generate as a stimulus for brand. Literature have always emphasised on use of designs to stimulate brand recognition and brand loyalty (Bayunitri, & Putri, 2015). As a symbol of brand identity, a good logo should be easily remembered to create a deeper brand association (Lencastre, 1997). Hence, the study will also test recall of brand logos that are designed for the experiment. The study will test the following hypotheses (alternate):

H1: Logo designs adhering to Birkhoff's theorem will generate higher affect than designs that are non-Birkhoff's.

H2: Logo designs adhering to Birkhoff's theorem will generate higher preference than designs that are non-Birkhoff's.

H3: Logo designs adhering to Birkhoff's theorem will generate higher recognition than design that are non-Birkhoff's.

METHODOLOGY

Common methods used in experimental aesthetics have been exercised in this study (Benjafield, 1985; Berlyne,). 15 logos were selected from foreign businesses which were unlikely to have been seen by the subjects before. All the logos were selected from a manuscript containing logos and symbols (Kuwayama 1973). Birkhoff's Theorem was used to obtain ratings for the logos. Logos were then divided into two sets, one set containing logos with high Birkhoff's values and the other with low Birkhoff's values. Multiple dependent variables were examined (Recognition, Affect, Preference)

Recognition: Subjects were shown 7 logos on a screen, one after the other for approximately 2 seconds. After that the subjects were engaged in some activity which lasted for around 20 to 30 minutes. Next, a second set of slides were shown on the screen which contained a total of 15 logos out of which 7 logos were the target logos shown in the first slide, and the rest were fillers. Each logo had the question "Did this logo appear in the slide show? (Yes, No). The responses were recorded.

Affect: Affective ratings were adopted from existing literature on experimental aesthetics. The ratings chosen were Like or Dislike, Good or Bad, High or Low quality, Distinctive or Not distinctive, and Interesting or Uninteresting. All selected logos were used to test affect, one logo each was shown on a page with the affective ratings.

Preference: A four-item scale is used to measure the relative preference a consumer has between the logo designs. All selected logos were used to test preference, one logo each was shown on a page and preference scale was used to obtain the preference ratings.

ANALYSIS AND FINDINGS

The results of experiment-1, performed for measuring logo recognition, indicates that the logo with the highest Birkhoff's value (0.40) got the highest percentage of correct recognition (91.97%) and the logo with the lowest percentage of Birkhoff's value received the lowest recognition (17.51%). Another sample data was obtained by experiment-2 which measures the affect and preference of the 15 logos. This result was sorted in descending order of the Birkhoff's values of logo. Mean splitting was done to perform the experimental analysis. Independent t-test were then performed to

check the mean difference and affective responses and preferences. The result of the independent t-test indicates a significant difference between high and low groups on affective responses ($t=0.33$) for a p-value below 0.05 level. The result of the independent t-test indicates a significant difference between high and low groups on affective responses ($t=0.33$) for a p-value below 0.05 level. The result of the independent t-test indicates a significant difference between high and low groups on preference responses ($t=5.107$) for a p-value below 0.05 level. The result of the independent t-test indicates a significant difference between high and low groups on affective responses ($t=0.33$) for a p-value below 0.05 level. All results are in accordance to the hypotheses stated earlier.

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