

Influence of Colour and Form in Product Choice: Cognitive Ergonomics Perspective

A Thesis

*Submitted in partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy*

By

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(10610501)

Under the Supervision of

Prof. Debkumar Chakrabarti
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Guwahati, Assam, India

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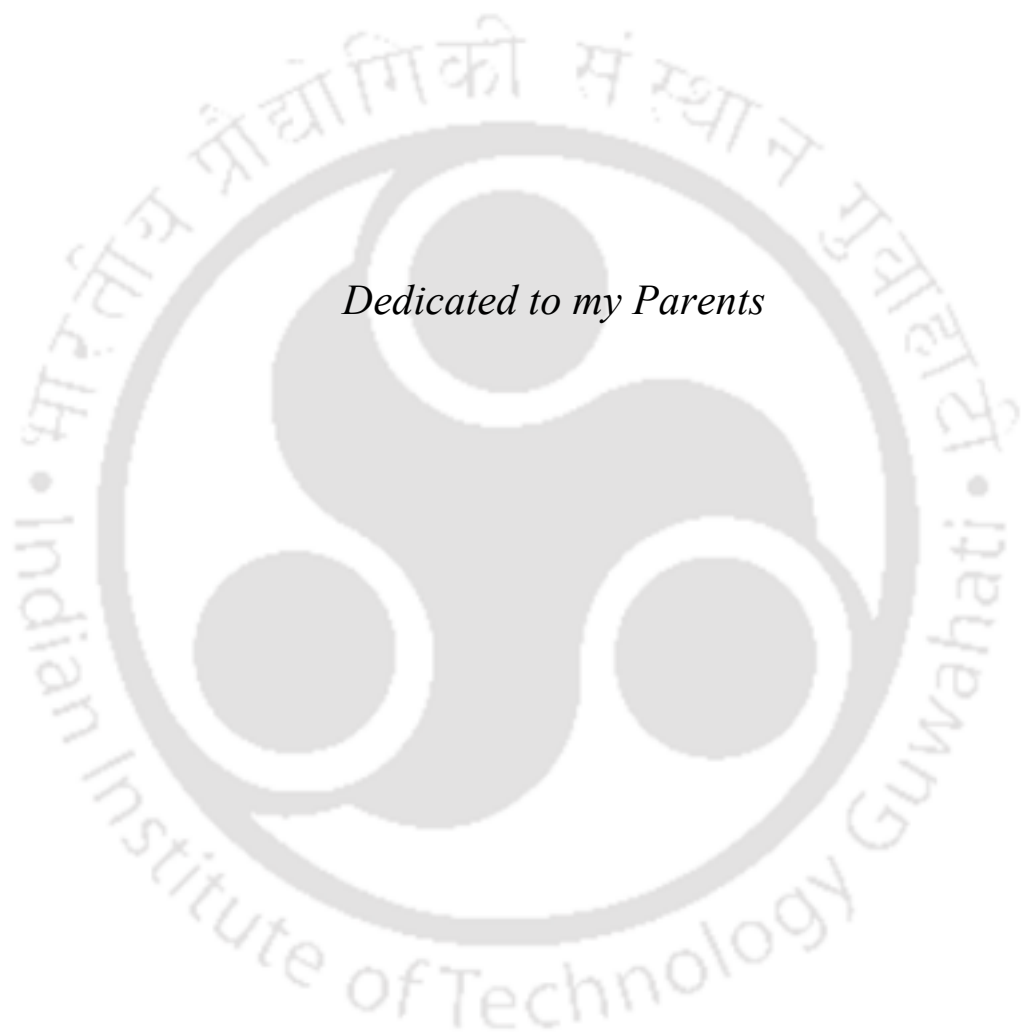
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December, 2017



Dedicated to my Parents

DECLARATION

I hereby declare that the work contained in this thesis entitled “Influence of Colour and Form in Product Choice: Cognitive Ergonomics Perspective” is my own work carried out under the guidance of Dr. Debkumar Chakrabarti and Dr. Sougata Karmakar at the Department of Design, Indian Institute of Technology Guwahati, Assam. This work done for the award of Doctor of Philosophy has not been submitted elsewhere for any other degree or diploma.

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CERTIFICATE

This is to certify that the work contained in this thesis entitled “Influence of Colour and Form in Product Choice: Cognitive Ergonomics Perspective” has been carried out under my guidance and supervision and is a bonafide work of Swathi Matta. This work submitted for the degree of Doctor of Philosophy is original and contains no material previously published or written by any other person for degree or diploma at IIT Guwahati or any other institute or university. All the requirements including mandatory coursework as per the rules and regulations as mentioned in the PhD ordinance for submitting the thesis for PhD degree of Indian Institute of Technology Guwahati have been fulfilled.

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Abstract

Consumers' product choice is influenced by product's physical appearance to a great extent and therefore, a product's market share is largely influenced by product aesthetics. An extensive consumer-product interaction takes place due to the outer appearance of the products. Visual sense is the most dominant in product-buying experience. The visual appearance of products plays a large role in decisive consumer response. Therefore, understanding the visual interest of consumers is very important.

This visual attention or visual interest is captured by the physical attributes of products e.g. colour, form, texture, graphics, typography, detailing, etc. Among various physical attributes of a product, colour and form capture maximum visual attention and thus play significant role in consumers' product choice decisions. Physical properties of products elicit certain appearance attributes which are contextual depending on the category of the product. Since we buy different products for different use, we perceive them differently and our visual evaluation differs depending on the context and category of the product. Following an extensive literature review, it has been observed that there is rarely reported empirical evidence regarding how people make choice of colour and form for a particular product and how consumers' preference of colour and form varies from one product category to another.

In the present research work, empirical studies were carried out in order to understand visual behavior of young Indian consumers which provided augmented valid results. The aim was to understand the choice making of products based on two important physical attributes, i.e. colour and form for few daily consumer products by the Indian student population. To achieve this aim, six objectives were set to carry out research step by step. Prior to conducting experimental research three hypotheses were formulated for ensuring an appropriate direction to the research work.

From the earlier reported literature, it is understood that the colour and form are most influential compared to other physical attributes of a product and thus present research focuses on these two aspects during product selection process. The study focuses on the young student population of India because this age group has an inclination towards buying interesting, colorful and extra-ordinary products. Therefore, students from an Indian higher education institution (Under-Graduate and Post-Graduate level, age: 18-25 years) where students are of cosmopolitan in nature, have been chosen to be the target population. The current research involved detailed studies

with both subjective and objective measurement techniques. In case of subjective preference, standard questionnaires were used whereas for the objective/quantitative technique, visual attention analysis by eye tracking was adopted. In questionnaires a suitable measurement scale was constructed aiming at the preference study which is associated to visual attractiveness, likeliness for colour and form, product purchase intentions, etc. Inferential and descriptive statistics were used for analysing the generated data.

Observations of current research revealed that most of the participants (95%) chose different colour variations (due to varying saturation value) of different primary colours rather than choosing variations under a single primary colour which they earlier chosen as their favourite colour among primary colours when asked verbally. Studying the preference of colour and form among different product categories demonstrated that colour is always not preferred over form; and vice-versa. Preference differs with change in category of the product. Participants' preference towards colours and forms under present study varied significantly across product categories.

The upshot data produced from current research, regarding Indian Consumers' (Indian Consumers: Undergraduate and Postgraduate students from a premier higher education institution) preferences towards colour and form among different products categories would be useful to product designers and marketing managers to formulate design strategies. The reference database on consumer preferences developed in this thesis can serve as a ready manual providing direct information about what kind of colours and forms to be used for gaining the attention of the consumers. The research methodology followed in the current research can guide similar studies related to preference of colour and form involving different other products. Limitations of this research and the future scope of work have also been highlighted in the present thesis.

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Chapter 1

Visual Attributes of Products and its influence on Consumers in Product Choice: Introduction and State of the Art Literature Review

Chapter abstract: This chapter features background of the research area and the current research issues are highlighted. This chapter delineates a state of the art literature review that was carried out concerning consumers' product choice with respect to physical attributes (colour, form, texture, typography, graphics etc.) of products. Physical attributes play as determinants in consumer buying behaviour and visual attractiveness serves as a marketing tool. Visual appearance controls consumer product evaluation and product choice making. Studies also show that product evaluation based on physical attributes may depend on the kind of product. Further, there is a need to evaluate with empirical studies regarding the significance in the difference of consumer product evaluation based on physical attributes among different categories of products. Scientific studies indicate that among all the physical attributes, colour and form influence the most in product choice. Role of colour and form in product selection were explored along with description of various colour models and theories of product forms. Following literature review on visual attention capturing methods for objective evaluation of preference towards product's physical attributes, eye tracking technique has been identified to be the appropriate and efficient tool for achieving the goal of the present research. From the earlier reported studies, it is perceived that visual attributes of products have a large influence on consumer buying behaviour and it is also understood that the colour and form are most influential compared to other physical attributes of a product and thus present research focuses on these two aspects during product selection process. The study focuses on the young-adult participants (under graduate and post graduate students from a premier Indian higher education institution) whose age ranged from 18 to 25 years. The aim and objectives of the research have been put forth in this chapter along with formulated hypotheses. Research methodology, research framework and scope of present research are laid out in this chapter. The flow of whole thesis work was systematically presented.

1 Introduction

Change in consumer attitude and behavior in the couple of decades is demanding effective changes in the way products are designed. It has become important to manage closely about the interests of consumers and what they see. We consume things and buy products according to our needs, preferences and buying power. Product appearance rules the commercial success and influences the consumer quality-of-life (Crilly *et al.*, 2004). Concern of what to buy, how to buy, where and when to buy, in how much quantity, depends solely on one's perception, self-concept, social and cultural background, age and family cycle, attitudes, beliefs, values, motivation, personality, social class and many other factors that are both internal and external to us.

Today, 70% of the consumer choices are made at the shelf for buying, 85% of the products are chosen without picking up the competitive item and 90% of the choices are made only by seeing the front face of the product (Clement, 2007). Therefore, it can be stated that the physical attributes of a product play a major role while a consumer is choosing a product. Interpretation of consumer's product selection process is an area of interest for consumer behavior for developing marketing strategy. Malcolm Gladwell suggests that when a product is presented with a choice, the subconscious mind makes a decision within a few seconds (Gladwell, 2005). Before a consumer gets a chance to evaluate the product features, function etc. there is already a baseline impression created in the consumer's mind by its appearance. Human subconscious establishes an impression instantly when an object is seen. Consumer behavior towards product results in cognition and affect, which are followed by behavior (Bloch, 1995). If it is true that "seeing is believing" and "believing is buying" then it is vital to check on the consumers' eye-on products (Wedel and Pieters, 2006). Visual appearance of products plays a large role in decisive consumer response (Crilly *et al.*, 2004). The human perception is dominated by vision and the attractiveness of products is immensely rooted in visual perception (Baxter, 1995). Several visual attributes constitute the visual appearance of a product and the research focuses to understand the importance of various visual attributes of products in influencing choice making. Through an intense literature review, influence of visual attributes of products, the visual behavior of consumers and evaluation tools and techniques for studying visual interest during the product selection process of the consumers has been explored.

2 Background of Present Research

Although researchers and managers emphasize on the importance of understanding consumer and buyer behavior, the information is not fully grasped yet (Kumar, 2016). There is a great need to study consumer choice behavior in developing markets (Reddy *et al.*, 2012, Khan and Mohsin, 2017). Consumers interact with a wide range of diverse products in their daily life. Numerous factors influence a consumer's decision while choosing a product (Kotler and Keller, 2011). Some of these factors include functionality (Norman, 2013), price (Hakim and Susanti, 2017), brand (Schifferstein and Hekkert, 2011; Beckley *et al.*, 2012), celebrity influence (Mortensen, 2014; Raut and Das, 2011), aesthetics (Mata *et al.*, 2017), typography (Baines and

Haslam, 2005; White, 2013), warranties (Alqahtani and Gupta, 2017), packaging (Groth, 2005), characteristics of display ambience (illumination level, background light, presence of other objects etc.) (Fiore *et al.*, 2000), characteristics of the consumer (socio-economic status, educational level, regional variation, culture and religion, age etc.) (McDonagh *et al.*, 2002), tactile sensations (weight, soft/hardness, smooth/coarseness, ease of grasping/holding) during handling/holding a product (Peck and Childers, 2003a; Krishna, 2011) etc., depending on the kind of product the individual plans to buy. Product fulfills a number of needs of human beings; and its functional appropriateness along with fitness for purpose marks the product's success in the market.

Consumers' attention on a product is created by its physical appearance (Yadav *et al.*, 2013, Wu *et al.*, 2014). Consumer preference and purchase largely is influenced by product appearance (Chuang *et al.*, 2001; Lin *et al.*, 2007). Thus, the product appearance is more important for the consumers before purchase than the price of the product in policy-making (Ho and Lu, 2014; Borsci *et al.*, 2016). Product must catch consumer's eye visually first and then they go on wanting to know about the price of the product (Norman, 2004). Additionally, online purchasing cannot allow real interaction while the only interaction that can happen is through visual perception of product perception (Diego-Mas and Alcaide-Marzal, 2016). It has been found from the literature that most of the interaction of consumers with objects is limited to a physical engagement with surfaces or the outer cover of the objects (Boradkar, 2010). Attention here is on the visual sense because it is the most influential and dominant one in perceiving things (Bundesen and Habekost, 2008). 80% of the assimilation through senses is by vision (Morton, 2009). Visual attention is captured by the Physical attributes of the product: colour, form, texture, graphics, typography, detailing, (Scott, 1951; De Sausmarez, 1983; Hannah, 2002) product display environment (background, illumination). There are three key characteristics of things to illustrate the overall physical delineation and contours of objects – form, surface (includes colour) and details (refers to buttons, grooves, grills, and other elements of the object's body) (Boradkar, 2010). Graphics on the packaging of products plays its role in creating an interaction between the consumer and the product (Rundh, 2009). Product appearance through colour splits, form, size etc. can have aesthetic and symbolic value for consumers and can give an impression of quality (Creusen and Schoormans, 2005). Physical attributes of a product/ object/ space affect human psychology and emotion

which has profound influence in choice making. Producers make people want to touch and hold by designing the unusual form (Eastwood *et al.*, 2001; Fenske and Eastwood, 2003). In marketing, advertising and academic research, colour is considered as having vital role because colour and product associations have an influence on consumer's intent to purchase (Vantturley, 2007; Ettis, 2017). Product colour influences in sales and using an appropriate colour is essential (Umezue and Takahashi, 2017). The first thing we register when we assess anything is colour and it is always obvious to make associations with certain colours (Ambrose and Harris, 2003; Gilbert *et al.*, 2016). Noiwan and Norcio (2006) stated that colour attracts human attention greatly. Colour and form influence the most in visual behavior of consumers. Form of a product relates to the consumers' psychological and behavioral responses (Bloch, 1995). An initial impression is created by the product form and it generates inferences regarding other product attributes (Bloch, 1995). It has been found that product form and consumer responses interact with one another in a complex, mysterious and unpredictable way (Crilly *et al.*, 2009). In clustered markets, form contributes to gain consumer notice and is an important means of communicating information to consumers. Form of the product can influence the perception of taste therefore form plays an important role in product packaging of consumable drinks (Velasco *et al.*, 2016). Colours and shapes convey about 80% of all visual communication (LaCroix, 1998).

In general, a product can be an idea, a method, an object obtained at the end of a process. Products can be tangible or intangible and also a combination of tangible and intangible attributes. Besides, their utilitarian functions, products are also bearers of meaning (Dagmar, 2009). A product in context of present research means a tangible product, which consumers can see, feel, smell or even taste. It could be a consumer product that is used daily and which is commonly bought by individuals for personal use. In this thesis, products are grouped into three categories on the basis of their functionality, purpose of use and context of use. These three product groups are considered as product categories. In the present research, such products are grouped in to products with non-recognisable function. Another group of products whose functionality is easily identified from their outer look are grouped as products with recognisable function. From the earlier reported studies, it is clear that both colour and form are the most important product attributes. An intense literature review regarding two basic physical attributes of product i.e. colour and form has been presented in the next section.

3 State of the Art Literature Review

Consumers interact with an unlimited number of products everyday. Products rejoice a number of needs and functional appropriateness along with fitness for purpose marks the product's success in the market place. Besides these, there is another form of functionality called soft functionality (McDonagh-Philp and Lebbon, 2000). This functionality refers to the emotional needs and other intangible, qualitative aspects that play a role in affecting the relationship of the user with the product (McDonagh *et al.*, 2002). Wilson *et al.* (2001) mentions that the main factors that directs to a decision to purchase a product in preference to another as availability, affordability, desire and need, which in turn are influenced by other factors such as technology, geography, income, status and culture. The factors influencing product choice making were grouped into six categories: aesthetic, cultural and traditional, social-psychological, economic and political, managerial, and physical (McDonagh *et al.*, 2002). Don Norman in his book, "Emotional Design" proposed a framework for the analysis of products that include: attractiveness, behavior, and the image they present to the user and of the owner. He defined it as the three different levels of processing by people: Visceral, behavioral, and, reflective. Visceral design: it is primary to that initial impact, to its appearance; Behavioral design: it is the total experience of using a product; Reflective design: it is that creates thoughts afterwards, how it makes one feel, the image it portrays, the message it tells others about the owner's taste. All the products have "multiple-dimensions" on which they need to be evaluated. Moreover, we buy different products for different purposes (Norman, 2004).

There is a level of exhaustion reached by the technology in the present market scenario and every brand provides almost similar services in terms of quality, features and cost etc. leaving the consumers in a dilemma of which one to choose (Veryzer, 1995). While in such a scene, the companies are preparing themselves to sell out visually aesthetic products to grab more buyers. The importance of the aesthetic aspects of a product (e.g., shape, color, texture, etc.) as a determinant of consumer behavior is increasing. In the highly competitive market place today, visual attractiveness of products serves as a marketing tool. Research says that among the universal values, aesthetics has a special relevance to consumer behavior in three ways: aesthetics is innately appreciated (Langlois *et al.*, 1991), has evolutionary benefits (Dutton, 2003), and is applicable in a product context (Townsend and Sood, 2012). It is found that

unlike the other universal values identified, such as theoretical, economic, social, political, and religious; aesthetics is the primary one with a direct expression in consumer products (Townsend and Sood, 2012). Consumer behavior research has been focused on the sensory marketing for the past years where in it suggests that sensory aspects of a product such as looks, smell, touch and taste influence consumer evaluation of a product (Bone and Jantrania, 1992; Morrin and Ratneshwar, 2000; Bloch *et al.*, 2003; Peck and Childers, 2003b; Alpert *et al.*, 2005; Nowlis and Shiv, 2005; Hagtvedt and Patrick, 2008), and affect behavior. It is found that appearance of a product may be influenced by texture (Hsiao and Chen, 1997). Texture is the property of the surface of a product/ object. According to visual arts, product aesthetics is dependent on the perceived surface quality. Texture of a product depends on the type of surface materials and can be perceived by both visually (Caelli and Julesz, 1979; Lovano-Kerr and Rush, 1982) and by means of tactile perceptions (Berkowitz, 1987; Springgay, 2004). Light helps in visual perception of surface texture dramatically perceived through human eyes. Even, product colour, form in combination of textures appeal for human emotions (Bar and Neta, 2006).

Most objects bought these days are just for their functional, hedonic or psychosocial benefits and are in a while eventually discarded. Sometimes, consumers purge out durable products that still function properly (DeBell and Dardis, 1979; Van Nes, 2003), because either they look old-fashioned or because they are no longer compatible with other products or because new products in the market offer more possibilities, and so on. From the sustainability point of view, a high product turnover is in many cases unwanted, since it produces waste and it uses up more scarce resources of the planet. Therefore, it is found by the researchers that it is worthwhile to attempt to lengthen the psychological life span of durable consumer products (Cooper, 2000; van Hinte, 1997). Increasing the attachment people experience towards the products they use and own is one possible strategy to slow down product life cycles (Brezet and van Hemel, 1997). It is obvious that when a person is attached to a product, it is seen that it is taken care and service it when it breaks down and suspend its replacement as long as possible (Schifferstein and Zwartkruis-Pelgrim, 2008). This kind of attachment can be created by elevating the choices of the products (visually different products) for the consumers. This study would help the product development managers in refining the procedure they follow in the colour or form selection for products.

If various color, form or texture or the combinations of these and various other physical attributes of products are presented to the consumers at the market place while they are making a purchase, they are bound to be attracted to specific products of their personal choice and it is rare to let go of something a person has peculiarly chosen among many thus starts creating an attachment. The emphasis here is on the attractiveness of the product. The physical appearance of the product triggers instant affect on consumers. The attractiveness of a product is categorized into four ways - prior-knowledge attractiveness: it is the recognition of a product previously used and liked; semantic attractiveness: it is that makes you feel that the product works well; symbolic attractiveness: it is when the product appeals to the personal and social values of the consumer; and intrinsic attractiveness: it is the inherent beauty of the product's form (Baxter, 1995). The surfaces and the outer cover of the objects engage consumers in the maximum interaction (Boradkar, 2010). Aesthetic experiences involve our entire body but the visual, auditory and the tactile dimensions play the most significant role in our interactions with products, during both process of production and consumption (Boradkar, 2010). Among all the senses, visual sense is found to be the most influential and dominant while consumers are observing the products (Bundesen and Habekost, 2008).

3.1 Physical attributes of products

The studies show that the visual appearance of a product can control consumer product evaluations and choice making in several ways (Creusen and Schoormans, 2005). Physical attributes of a product/ object/ space affect human psychology and emotion has profound influence in choice making. The initial visual impact that a product makes on a consumer is a major factor while making purchasing decisions (McDonagh *et al.*, 2002). Utmost importance is given to the visual appearance because it is found to be a critical determinant of consumer response and product success at the market (Bloch, 1995; Crilly *et al.*, 2004). It is found that it is aesthetics that distinguishes products and makes the difference between the success and failure of a product (Ben-Bassat *et al.*, 2006; Duncum, 2007). Appearance has an influence on product preference even for industrial products (Yamamoto and Lambert, 1994). Consumers would want to express themselves to others through purchasing products of

a kind (Belk, 1988; Kleine *et al.*, 1993) and such a communication is easiest through the physical attributes of the product/visual aesthetics (Townsend and Sood, 2012).

3.1.1 Colour

Colour has the capacity to attract human attention to a great extent (Noiwan and Norcio, 2006). Colour is defined as the byproduct of spectrum of light which is received by the human eye and processed by the human brain after it being reflected or absorbed. Colour is the physical property of light. The frequency of light our eyes detect is called colour. Colour is nothing but the measure of how quickly the light waves are moving. If our eyes were powerful enough then we might be able to observe this periodic motion directly as similarly as the motion of boat on the waves of an ocean. The frequency of light is so high that the waves go up and down more than 4 hundred million times a second and that is the reason human eye cannot see it as a wave. Frequency of light can be predicted by its colour. If the frequency is lowest then it is red and if the frequency is highest, then it is purple. In between red and purple, all the frequencies form a continuous band of colour called the visible spectrum. Sun emits all the colours of light and light of all the colours hit the objects we see. But a green pencil looks green because it reflects green light and absorbs all the other light. The absorbed light energy is then turned into heat. In the similar way, blue things reflect blue light and yellow things reflect yellow light, while white objects reflect all colours of light and black objects absorb at all frequencies (Kelleher, 2012).

While this is the physics behind colours, colour is also the phenomenon which is a primary sensory experience for most human beings. Colour is the physical property of light. In the RGB colour model, the region where red and green overlaps is yellow. Actually, here there is no yellow light present at all. This mixture of red and green region looks yellow to us because of the strange way of how humans see colour.

Retinal composition and function: Retina contains two different types of light detecting cells; called rods and cones. Rods are used for seeing in low light conditions and there are only one kind of those. In the dark, we cannot see colour because rod cells take over and because these are only one kind of rod cells, only one kind of signal is sent to the brain which is light or no light. Cones on the other hand detect colour and there are three kinds of cone cells; ones responding to red, green and blue. When human eye sees colour, each cone sends its own distinct signal to the brain. For example, if you see red, cones that correspond to red, signals the brain and same is the case with

green and blue as well. But when human eye sees yellow light, though there are no cones specifically signaling yellow and since yellow is kind of close to red and also close to green, the red and green cone cells get activated sending signals to the brain allowing to see yellow. Another way to activate the red cones and green cones simultaneously is if red light and green light are present at the same time and making it appear yellow. And this is the reason why for in case of light (RGB colour model), red plus green together appears yellow to the human eye.

There are infinite number of physical colours. But because humans have only three kinds of cones, the brain can be tricked into thinking that it is seeing any colour by cautiously mixing together the right combination of just three colours red, green and blue. This property of humans is really helpful in the real world because in case of manufacturers of devices employing light, such as computer monitors and television sets; instead of including infinite number of colours into the devices to simulate the real world, the manufacturers only have to put in three colours red, green and blue (Kelleher, 2012). In case of printing and painting, it is not the colour light but the colour pigment that is used. The physical products are usually either painted, powder coated or molded in colour. This needs colour pigments. The printing technology also need colour pigments.

Colour Pigments: Pigment is the material or powder that composes the colour of paint. Pigments are organic as well as inorganic. Organic pigments are made from plants or animal sources like ivory black, indigo etc. and inorganic pigments are made from salts or metallic oxides like ocher, cobalt blue etc. There are different colour models followed for different kind of use. There are broadly three kinds of colour models the RGB, CMYK and RYB colour model.

RGB colour model: The RGB colour model (shown in figure 1.1) is for colour in devices employing light like the television, computer and other video displays. It is an additive colour system with primary colour red, green and blue (Thomas and Christopher, 1999). Additive mixing of red and green light produces shades of yellow, orange, or brown; mixing red and blue produces shades of purple, including magenta and mixing of green and blue produces shades of cyan; mixing nominally equal proportions of the additive primaries results in shades of grey or white. Recently some TV and computer displays have started the four primary technology (Garvey, 2010) which includes yellow as the fourth primary but even this technology has not yet reached range of colors the human eye is theoretically capable of perceiving

(Pointer, 1980). The primary colours in the RGB model have been chosen to suit with human capabilities so that human eye sees it as natural colour. John Gage states that “colour is the attribute of visual experience that can be described as having quantitatively specifiable dimensions of hue, saturation and brightness” (Gage, 1999).

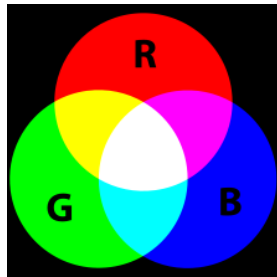


Figure 1.1 RGB colour model

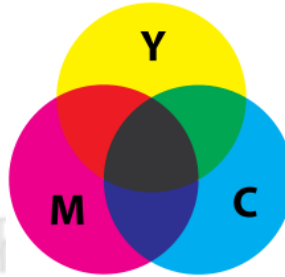


Figure 1.2 CMYK colour model



Figure 1.3 RYB colour model

The terms hue, saturation and brightness are used in the HSB colour model. Hurvich and Jameson devised the HSB colour model which is a psychological colour specification system (Hurvich and Jameson, 1956). A hue is a pure colour with no black or white in it. Saturation is the intensity of a hue from grey. When a colour has maximum saturation, then it has no grey at all and when a colour has minimum saturation, then it will contain mostly grey. The amount of white or black contained within a colour is called brightness (Boulton, 2009). These terms are used to organize, describe and precisely specify colours (Camgöz *et al.*, 2002) in the colour palette and colours are represented in terms of R, G and B components.

CMYK colour model: The CMYK colour model (shown in figure 1.2) is used primarily for printing and is a subtractive colour method of mixing colours with cyan, magenta, yellow and yellow as the primary colours (Frank and Mita, 1917). Mixing yellow and cyan produces green colours; mixing yellow with magenta produces red colours, and mixing magenta with cyan produces blues. And mixing of all three colours produces grey colours and when mixed in sufficient density produces black. But when

in real practice, they produce muddy brown colours rather than black therefore to save ink and decrease dying times, black is added extra to cyan, magenta and yellow.

RYB colour model: Red, Yellow and blue are a historical set of subtractive primary colours in the RYB colour model (shown in figure 1.3) used in art, art education and painting. Mixing red and yellow gives orange, mixing red and blue gives violet (or purple) and mixing blue and yellow gives green, therefore VOG are the secondary colours in this colour theory. Mixing all the three primary colours results in black. The foundation of 18th century theories of colour vision was the RYB primary colours. In late 19th century even after the more versatile CMYK colour model came into existence, still RYB model was used for printing for some period of time.

3.1.2 Form

At a broad level, it is said that everything that is visible has form. Everything with shape, size, colour, and texture that occupies space, marking position, and indicating direction is called form (Wong, 1993). A form need not always be created to convey a meaning or message; it could be for mere decoration. There can be simple, complex, harmonious or discordant forms which are self-contained and positive shapes that occupy space (Wong, 1993). There are two-dimensional and three-dimensional forms. Two-dimensional forms can be man's writings, drawings, paintings, decorations, designs, and doodles which are of shapes and colours. They are points, lines, and/or planes that are on a flat surface. Three-dimensional forms are things we can walk towards, away from, or around. It can be seen from different angles and from different distances that can be touched and/or handle if in within reach. Human experience is primarily three-dimensional since we live in a three-dimensional space and three-dimensional forms can either be in motion or stationary. There is an interaction between three-dimensional forms with other three-dimensional happening in the environment (Wong, 1993).

Form and shape are frequently used synonymously but they do not mean the same. An area which can be easily defined within an outline is known as a shape. A shape when given volume and thickness which can exhibit various views or outlook becomes a form. Forms possess characteristics associated with three-dimensional figures displaying some depth and volume. And when forms are observed from particular angles, from particular distances represent shapes. Therefore, a form can have many shapes (Wong, 1993).

Form is not arbitrary and there are a wide range of opinions about where form comes from (Wake, 2000). Louis Sullivan, a nineteen century architect said “form follows function”. As the times and tastes changed, the architects started to work the other way round, having function follow form, constructing a sculptural form of a building, then fitting functions and structural system into the form created. Apart from these two options, there is a third possibility which will be discussed in the later part of Chapter 1. It is said that most design forms start with a paradigm and the objects that attain clever functional properties through their form are called simple-shape paradigms (Wake, 2000). Simple-shape paradigms are forms mostly made of single material that can be easily recognized, understood, grasped, described and appreciated for their simplicity. These are important both as individual as well as the building blocks for constructing more complex forms.

The most familiar and basic solid forms include the cone, the sphere, the cube, the torus and the cylinder (Wake, 2000). The basic geometrics (as shown in figure 1.4) can be modified giving rise to many forms by stretching them, pulling them, tilting them, and slicing off segments. There are the five (tetrahedron, cube, octahedron, dodecahedron and icosahedron) platonic solids described by the Greek philosopher Plato (shown in figure 1.5), which have the properties that are convex (like a ball) and composed of identical regular polygons, having each vertex alike.

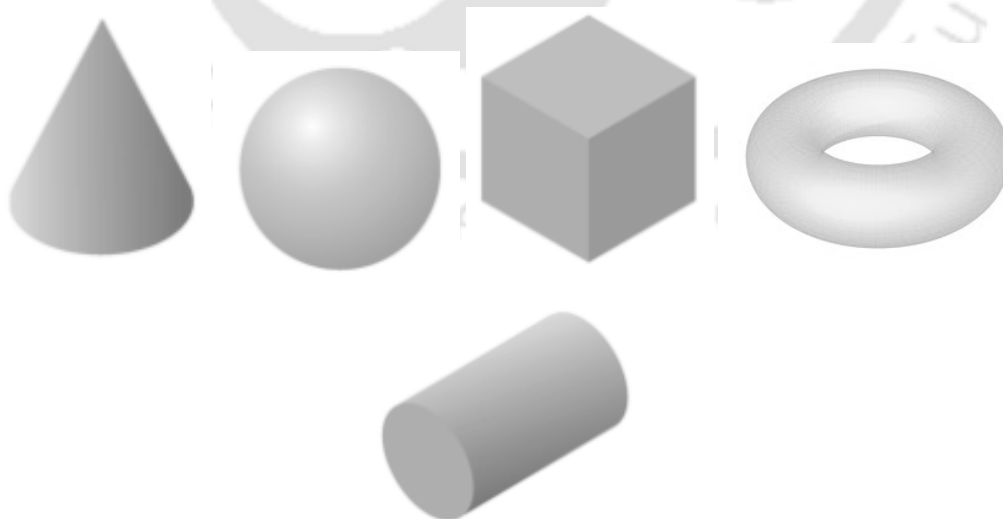


Figure 1.4 Basic solid forms

Plato beautifully described platonic solids which possess interesting characteristics. Each of these solids can neatly fit into a sphere with all its vertices touching the sphere and similarly, a sphere can be fit into any of the platonic solids with sphere touching each face of the platonic solid (Behnke, 1974; Heath, 1921). Some of the platonic solids are used in packaging and other applications, for example, tetrahedron is used in packing nuts etc. The five basic platonic solids were just the beginning of a vast array of convex and compound polyhedra (Wake, 2000).

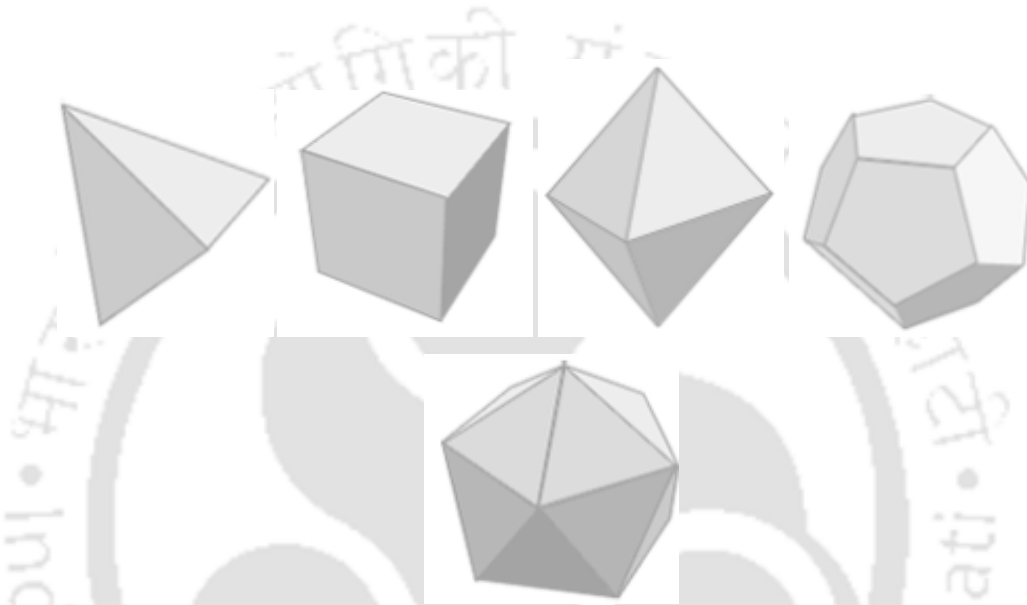


Figure 1.5 Platonic Solids

3.2 Role of colour in product selection

Decision to buy a product or not, can largely be influenced by its colour and it can dominate over other factors which lead towards product choice. Colour is one of the prominent aspects of visual aesthetics of a product. Colour has an effect on how a consumer perceives a product and can influence the purchase decision (Clarke and Honeycutt, 2000; Sable and Akcay, 2010). Colour is an extremely significant product attribute because it segregates similar kind of products and it plays a major role in making buying decisions of consumers for different products. It is said that colour acts as a visual stimulus that attract people to touch and feel the product and also to an extent convinces people to buy. It is found that colour connects the viewers with objects more quickly than any other identifying characteristic (Akcay *et al.*, 2011). The influence of colour is very strong on visual aspects, appreciation, responsiveness and identification

of objects (Wichmann *et al.*, 2002). It is found that the colour of a product affects consumer product choice intensely (Clarke and Honeycutt, 2000) and can create an image about products that can be positive or negative (Grossman and Wisenblit, 1999; Singh, 2006). Research says that colour is capable of affecting consumer's perception of products, pull attention to and generate purchase decisions (Bellizzi and Hite, 1992; Kerfoot *et al.*, 2003; Sable and Akcay, 2010). Research says that an average consumer's decision to purchase a product is about 60%, on its color (Wagner, 1988).

Human sub-consciousness establishes an impression instantly when an object is seen and colour is a huge part of that impression (Gladwell, 2005). The corporate marketing communications strategy has colour as important integral element and is considered an important tool for shaping the consumer's feelings and responses (Clarke and Honeycutt, 2000). The intent of purchase is influenced by colour and product associations therefore it means that colour plays an important role in marketing, advertising and academic research (Vanturley, 2007). Colour influences consumer perception and behaviours and helps companies' position or make a distinction from the competition (Grossman and Wisenblit, 1999; Aslam, 2006). It is said that if the picture is worth thousand words, then a picture with natural colour may be worth a million, memory wise. Psychologists have found that colour boosts memory in the natural world (Wichmann *et al.*, 2002).

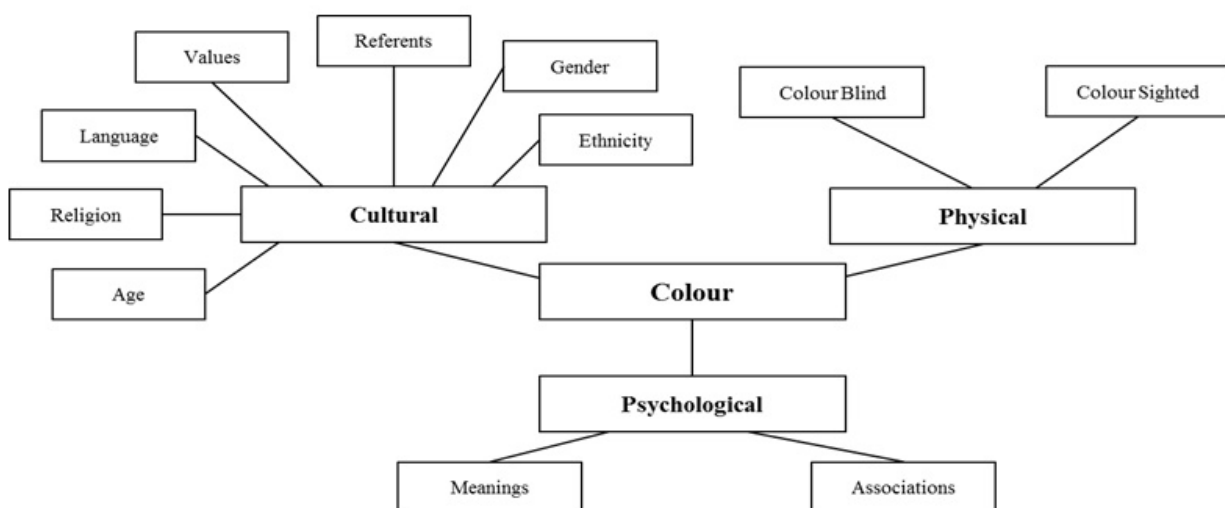


Figure 1.6 Elements of colour perception (Aslam, 2006)

Colour perception of colour consists of three elements: Cultural, psychological and physical as shown in Figure 1.6 (Aslam, 2006). In many different product domains and many different cultures, colour can evoke strong associations (Jordan, 2002). Colour has the potential to stimulate emotional response, affect persuasiveness and reflect prestige and can affect a consumer's overall perception of a product (Sable and Akcay, 2010; Sliburyte and Skeryte, 2014). Nonetheless, it is a complicated task to understand colour responses of consumers for various products due to the fact that consumers have developed a wide range of colour associations for various products (Ogden *et al.*, 2010). In food packaging, blue packages are considered healthier than red ones (Huang and Lu, 2016) and brighter version of colour are perceived as healthier than darker versions (Mai *et al.*, 2016). The use of colour in our everyday life is extensive and we associate colours with certain meanings (IAPA, 2007). Red for example at a traffic signal alerts or indicates us to stop. Colour plays a vital role in detecting objects quickly and the first reaction of people is at something that is most visible. This quick attention gives more time to react thereby, avoiding a hazard (Solomon, 1999). There are a set of colours used as safety colours at work areas, on machinery and equipment. According to ANSI/NEMA Z535.1-2006 (R2011) and OSHA (Occupational Health and Safety Act), safety colours are red meaning danger or stop, fluorescent orange and orange-red meaning biosafety, yellow meaning caution, orange meaning warning, green meaning safety, blue meaning information, Combination of black with white or yellow meaning boundaries and magenta or purple on yellow meaning radiation caution. Apart from these safety aspect associations with colours, the reactions to colours are also dependent upon cultural associations, trends, age and the individual preferences (Ambrose and Harris, 2005). In design, colour is an indispensable element that helps colour designers to understand the expectations of the target customers (Manav, 2007; Gong *et al.*, 2017). Colors have specific symbolic meanings in different cultures (Flynn, 2001).

3.2.1 Colour and Culture

Colour influences consumers depending upon his/her cultural background. Cross-cultural similarities and dissimilarities are many that exist and can control choice making (Madden *et al.*, 2000; Sable and Akcay, 2010). Religion plays a major part of culture and colours have association religion. There are certain colours which are

preferred in different cultures (Wagner 1988; Grossman and Wisenblit, 1999). For example, red implies creativity (India), anger (Japan), danger (U.S.), aristocracy (France), death (Egypt), or happiness (China) (Willard *et al.*, 2008). In the ancient Indian treatise on the performing arts called 'Natyashastra', there exists 'Navarasa' which portrays nine moods of the people and each mood is given a particular color (Ghosh, 2002).

3.3 Role of form in product selection

Form is another important physical attribute that can create a primary opinion about the product and it relates to the consumers' psychological and behavioral responses. It generates interpretations concerning other attributes of the product (Bloch, 1995). Consumers are attracted to product form that display its functionalism (form follows function), semantics (form follows meaning) (Krippendorff, 1995) and pleasure (Jordan, 2002). Form of a product relates to behavioural responses and consumer's psychology (Bar, 2004; Bar and Neta, 2006). The design or form of a product can contribute to its success in numerous ways (Bloch, 1995). In clustered markets, form contributes to gain consumer notice and is an important means of communicating information to consumers (Ares and Deliza, 2010). It is stated that "The reality of product design is that both product form and consumer response are determined by a vast array of factors and that these factors interact with one another in a complex and unpredictable way" (Crilly *et al.*, 2009). Product form sometimes portrays a metaphor in order to give product experiential properties and they can be very dominating (Jordan, 2002). For example, manufacturers of electric iron draw on metaphor to make their products look speedy. The lower, sharper makes the product look faster (metaphoric to speed boats) and the reason to adopt such a metaphor is because people find ironing an unpleasant task and by giving such a look will give an impression that they will make the work done as quick as possible. This association between speed and form is completely a perceived one and has no reason to assume that iron with sharper forms would make the work quicker (Jordan, 2002). There are forms that have become iconic in many product areas. There are particular forms that people of certain cultures have got associations with particular products. Changing such icons can be either disadvantageous or advantageous depending on the attitudes of people at whom the product is intended. Form of a product is accepted differently by different people depending on their mind-set. A corporate and brand identity can be developed through

product form. Therefore, companies such as Braun, Smith & Wesson, and Ralph Lauren have distinctive design philosophies that help them with a recognizable corporate character (Chang, 2011).

Figure 1.7 shows a systematic approach model of consumer responses to product form. It is drawn from number of disciplines including engineering, art psychology and ethology, and also relevant work from marketing and consumer behaviour (Bitner, 1992).

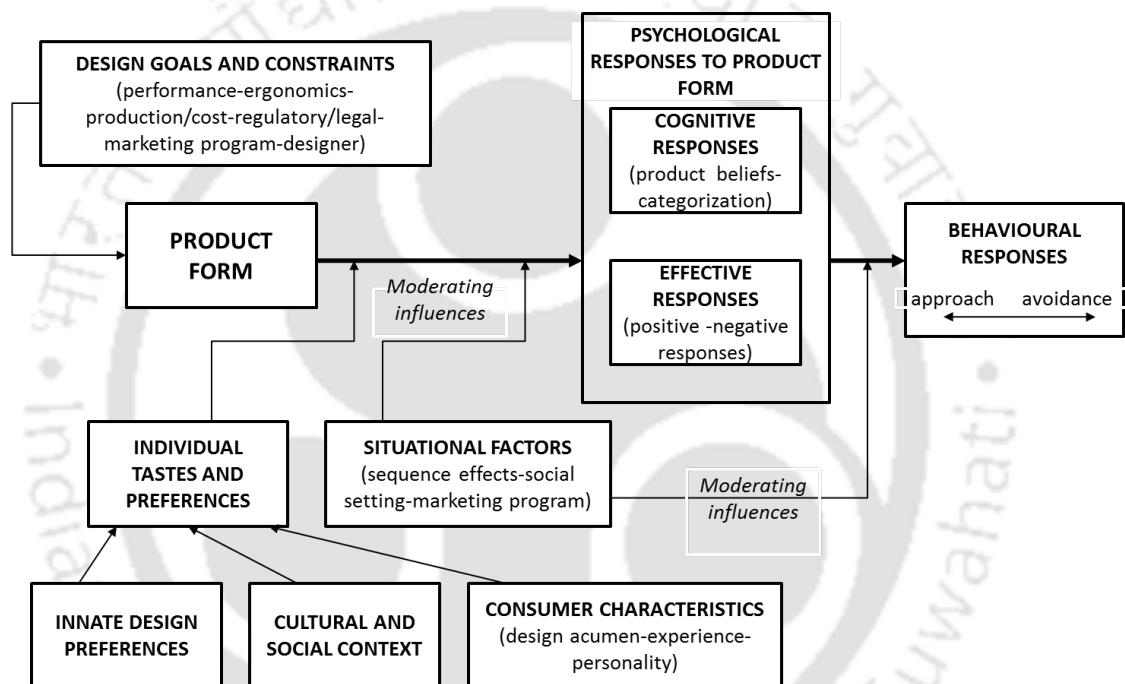


Figure 1.7 A model of consumer responses to product form (Bitner, 1992)

3.4 Colour and form preference across different products categories

The first thing which human being registers during assessing anything is colour and it is always obvious to make associations with certain colours (Solomon, 1999; Ambrose and Harris, 2003). Product form can create a primary opinion about the product and it generates interpretations concerning other attributes of the product (Bloch, 1995). Evidently, it is known from the literature (also discussed in Section 3.2 and Section 3.3) that colour and form play a major role among the visual attributes of products. But, it is not clear which among colour and form holds a vital role.

Earlier, consumer durables were only white and were referred as ‘white products’ but now colour choice is a demand from consumers and colour has become the ‘hot’ issue among the manufacturers (Jordan, 2002). Many investigations in consumer psychology on colour have concentrated on specific dimensions of colour and its effect on consumer responses (Gorn *et al.*, 1997). Bellizzi and Hite (1992) found that red caused more arousal than blue and conversely, products when presented with blue coloured background were liked more than products presented with red backgrounds (Bellizzi and Hite, 1992). However, these studies did not reveal its application in any specific product category and also such finding cannot be generalized across all product categories. For example, consumers may prefer cheerful colours for mobile phones but their colour choice may change to neutral colours like black or white when selecting home appliances like washing machines, TV etc. This difference in colour preference could be due to specific use of the product and the environment in which it is being used. Form of a product is accepted differently by different people depending on their mind-set. For example, Juicy Salif Lemon Juicer by Philippe Starke is an extreme design that attracts attention. While there are buyers who may enjoy the creativity and humor of the product, there must also be consumers who may feel unsure about buying such a product which is far from the conventional products. Swatch International launched a variety of uncommon product forms and could efficaciously stand out in the established market of wrist watches (Hollins and Pugh, 1990). From literature, it is found that there are semantic differential studies concerning product form perception where researchers attempted to examine the relationship between the participants’ evaluation of telephone samples and form design elements (Hsu *et al.*, 2000). Chuang *et al.* (2001) tested the relationship between consumer preference perception of mobile phones and elements of form design (Chuang *et al.*, 2001). Three parallel studies were done to uncover fundamental dimensions of affective responses to product shapes where the structure of product shapes and affective responses of three product categories- automobile, sofa, and kettle were investigated (Hsiao and Chen, 2006). During study of product form classification of mobile phones, Chang and Wu (Chang and Wu, 2009) aimed to extract the participant’s mental structure in order to discover the principal factors of product form classification (Chang and Wu, 2009). In a study to examine consumer preference for colour combinations in sports shoes, it was found that people like to combine colours which are comparatively close and also that people emphasize on hue and saturation and focus less on lightness (Deng *et al.*, 2010).

It is observed that car buyers look beyond functionality and consider design features that appeal to them (Helander *et al.*, 2013). Colour is one among the top considerations for Consumers while purchasing an automobile (Madden *et al.*, 2000). Automobile colour is a greatly visible and impressive feature which has been used to complement and enhance their form (Andrews *et al.*, 2006). In purchasing a car, research reveals that attitude towards colour, colour attractiveness and colour preferences play a significant role (Funk and Oly Ndubisi, 2006).

Augustin *et al.* (2012) conducted studies on different product categories concerning physical appearance related to terminology for description and measurement of aesthetic impressions of products (Augustin *et al.*, 2012). In another similar study, researchers worked on relationship between aesthetics and usability with washing machines and digital cameras (as stimuli), and they investigated the effects of novelty in product appearance by changing colour and form of products. Here, they used black colour for projecting the novel look in case of washing machines and the shape of digital camera was manipulated and deviated from typical shape to present in high novelty conditions (Mugge and Schoormans, 2012). A related study to check the effect of design newness on consumer response was performed where hairdryer was included with washing machines and digital cameras in the stimulus material in order to increase the generalizability of results (Mugge and Dahl, 2013). From all the above mentioned studies involving various product categories, it is evident that consumers can have different responses to product colour and product form with variation of product categories.

3.5 Capturing visual behaviour

3.5.1 Eye-Movement recording variables

The visual attention and behavior of consumers on products can be captured by monitoring the eye-movements. Eyes can make two classes of responses; one where the eyes do not move (blinking, accommodation, and pupillary responses) and other in which the eyes move (saccades, pursuit, nystagmus, vestibulo-ocular reflex and vergence). These are the variables to track visual behavior.

Blinking, pupil size, saccades, pursuit indicate the person's cognitive state. The blink rate is correlated to cognitive workload. The blink duration decreases if the task load increases. If the mental effort is more the pupil size increases. Viewer's interest in

a particular subject is indicated by the pupil size. If the difficulty of task increases, the saccadic velocity increases and if the mental fatigue increases, the saccadic velocity decreases. To understand these variables, knowing the eye anatomy and function was essential (Oyster, 1999).

3.5.2 Eye tracking technologies

3.5.2.1 Techniques based on Reflected Light

- **Limbus Tracking:** This is based on the position and shape of limbus (boundary that is between white sclera and dark iris of eye) with relative to the head. In this technique, either head must be held completely still or the apparatus must be fixed to user's head. Since the top and bottom of limbus can be occasionally covered by eyelids, it is suitable for horizontal tracking only (Scott and Findlay, 1993; Duchowski, 2007).
- **Pupil Tracking:** Pupil tracking technique is similar to limbus tracking. But, here the boundary between pupil and iris is used instead. In this technique, apparatus must be held absolutely still in relation to the head. Since pupil is less covered by eyelids, it enables vertical tracking. The disadvantage is the difference in contrast is lesser between the pupil and iris than between the iris and sclera (Merchant, 2001).
- **Corneal Pupil Reflection Relationship/ Video-Oculography (VOG):** Purkinje images are formed on boundaries of lens and cornea due to reflection caused by IR light falling on the user's eye. The relative positioning of the glint and center of bright eye changes when eye is panned horizontally or vertically. This relative position can help in calculating the direction of gaze. Problem that is caused due to this technique is that the video image of eye can be put out of focus due to that lateral head movement and this makes the image fall out of view of the camera. (Crane, 1994; Merchant, 2001; Jacob and Karn, 2003).
- **Infra-Red Oculography (IROG):** A fixed light source (infra-red) is directed at the eye and the amount of light reflected back to a fixed detector varies with the eye's position and measures eye movement. The IR light that is used is invisible to the eye and does not distract the subject. Spatial resolution is good for this technique. It is a better technique for measuring horizontal eye movements than vertical eye movements.

- **Artificial Neural Network:** This technique is based on the use of an artificial neural network. The raw material for eye gaze tracking is digitized video image of the user, which is then fed with an ANN. The output of the ANN is a set of display coordinates (Baluja and Pomerleau, 1994; Glenstrup and Nielsen, 1995; Merchant, 2001).
- **Dual Purkinje Images:** The 1st and 4th Purkinje images can be used for tracking the direction of gaze. Here it uses the relative positions of the reflection to calculate the direction. This is more accurate than other techniques. The sampling frequency is high and is up to 4000Hz. Disadvantage of this technique is that the 4th Purkinje image is rather weak and so surrounding lighting must be heavily controlled (Cleveland and Cleveland, 1992; Müller *et al.*, 1993).

3.5.2.2 Technique based on Electric Skin Potential

The technique of electro-oculography uses the electrostatic field that rotates along with eye to detect eye movements. Position of the eye may be detected by recording small differences in the skin potential around the eye. This technique allows to record eye movements of both eyes simultaneously. It is limited to retrieving only horizontal and vertical movements (Ryu and Myung, 2005; Bulling *et al.*, 2009).

3.5.2.3 Technique based on Contact Lenses

With the use of special contact lens, it is possible to make quite accurate recordings of the direction of gaze. One or more plane mirror surfaces are engraved on the lens in two lens technique and the reflections of light beam are used to calculate the position of the eye. Implanting a tiny induction coil into the special contact lens is another technique. By using high-frequency electro-magnetic fields that are placed around the user's head, the exact positioning of the lens can be recorded. Techniques based on contact lens do not seem feasible for a frequent usage since health issues connecting high-frequency electro-magnetic fields need to be resolved yet (Glenstrup and Nielsen, 1995; Duchowski, 2007).

3.5.3 Eye anatomy and function

We see things when there is light entering into our eyes. This causes nerve impulses to be sent to the brain. Light enters into the eye through a small hole called the pupil and is focused on the retina. Iris, the coloured ring of the eye, controls the amount of light entering the eye. Sclera covers the outside of the eye and in front of

sclera is a transparent layer called the cornea that allows light to enter the eye. Image formed on the retina is transmitted to brain by optic nerve and the image is finally perceived by brain (Snell and Lemp, 1998).

3.5.4 Eye Tracking

Eye tracking is a complementary usability evaluation technique when compared to other traditional usability evaluation techniques (Tzanidou, 2003). Eye tracking is one of the key technologies for evaluating visual behavior and cognitive workload since human eyes contain much information about the visual behavior (Duchowski, 2007). Nonintrusive methods for eye detection and tracking like eye-tracking are useful for many applications of vision-based evaluations (Gulliver and Ghinea, 2004). Eye tracking variables like fixation duration and fixation counts are commonly used metrics for evaluation of area of interest (AOI) and perception of viewers. Fixation duration is the amount of time spent in viewing a particular AOI and is shown in milliseconds. Fixation count is the number of considerable eye fixations a viewer shows in a defined AOI. The inference from these metrics is that, the fixation duration and fixation time of an AOI is more if the viewer is interested in that particular area and vice-versa. Heat maps and scan paths represent the AOI in a pictorial way. In case of heat maps, the area most viewed gets darker and larger in area (Figure 1.8).



Figure 1.8 Heat maps of a random frame of eye tracking video data

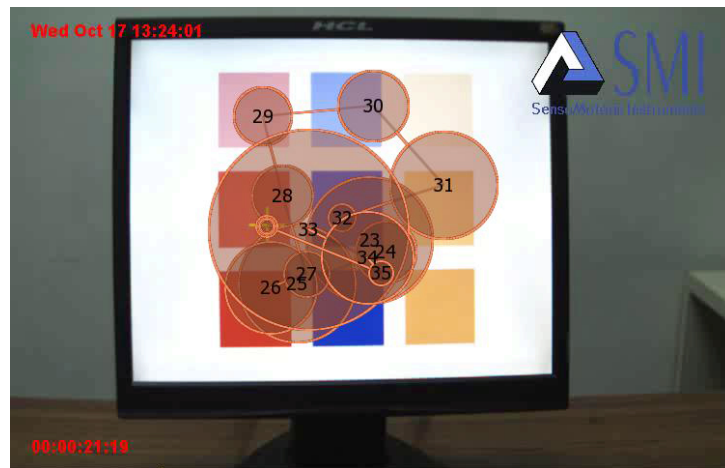


Figure 1.9 Scan path of a random frame of eye tracking video data

Scan paths show the order of fixations from the time of start till the end and is represented by connecting lines and circles, also the diameter of the circle increases with increase in duration time (Figure 1.9). Sufficient research has been done in various fields using eye tracking and found it to be efficient (Kukkonen, 2005; Tzanidou 2003; Zambarbieri *et al.*, 2008; Marshall, 2009; Roebers *et al.*, 2010; Tonkin *et al.*, 2011).

4 Area unexplored

We buy different products for different use and perceive them differently. Our aesthetic appraisal differs depending on the product category. Following literature review in previous sections, it is evident that among various factors, product's physical appearance to a great extent influence consumers' product choice and thus a product's market share is largely influenced by product physical appearance (Yamamoto and Lambert, 1994; Ben-Bassat *et al.*, 2006; Duncum, 2007). It is reported from the earlier studies that colours and forms convey the most in visual communication and that they are the most influential among all other physical attributes of product in decisive consumer response.

Consumers' product choice is a complex psychological phenomenon which is influenced by numerous factors. Following literature review, it is found that there is scanty reported study on colour and form preference of consumers and how these preferences varies across product categories. It is not clear from the literature that how the subjective preference towards product's appearance (say, colour and form) can be expressed in objective manner. Therefore, research work described in present thesis was planned to gather very basic insights towards colour and form preference as well

as to understand the dominance between colour and form during product selection. Surveys in this area that are done so far have always been subjective through questionnaire studies and the results captured were unsatisfactory (Schulte-Holierhoek *et al.*, 2017), while objective/ quantitative studies can give more accurate data (Van Raan, 2013). Following literature review on visual attention capturing methods for objective evaluation of preference towards product's physical attributes, eye tracking technique has been identified to be the appropriate and efficient tool that can capture visual attention of the consumers (Holmqvist *et al.*, 2003; Holsanova *et al.*, 2006; Bucher *et al.*, 2007; Quinn *et al.*, 2007) along with questionnaire study for achieving the goal of the present research. It is found that there is rarely reported literature regarding colour and form preference of Indian consumers for different types of products. As preferences to colours and forms are influenced by socio-cultural issues, there is clear research gap to carry out consumer research on this topic in Indian context and generate empirical data of preference towards colour and form or their combination for specific product. Many of the earlier reported studies casted some light separately either on preference towards colour (Huang and Lu, 2016) or towards form (van Ooijen *et al.*, 2017) but there is hardly any study which dealt with combinational effect of colour and form on product selection. To start with this type of research where too many influential factors are there, only limited number of variables-few basic colours and forms were considered (by keeping other factors relatively constant) to avoid complication of experimental design. Thus, there are limitations of present research and various issues including complex form and multi-colours have been mentioned as future scope.

As empirical data in this field of colour and form preference has not been attempted before and this could be valuable information for design research community, a research has been planned in the present thesis to explore the same with Indian young-adult population.

The above discussion regarding consumer's preference towards colour and form for choosing a product; evoked few research questions. They are as follows:

- Whether consumer like a single colour and all its variations (due to change in saturation value) or they like different colours and variations of those colours?
- Is colour always playing dominate role over the form of a product during product selection process?

- Does colour and form preference of an individual varies from one product category to another?
- How can we measure colour and form preferences of consumers in an objective/quantitative manner along with subjective/questionnaire study?

5 Problem Statement and Rationale behind Present Research

Understanding the perceptions and preferences of consumers has become increasingly important for the design studios, design schools, marketers and there is a need to conduct studies on the consumer preferences of colour and form during their purchase. The physical attributes of the product are very influential in consumers' choice making. Unlike before, the market now provides a range of colours and styles and variations in other physical attributes in consumer products such as clothes, laptops, mobile phones, kitchen appliances like mixers etc. All these influence the consumer buying behavior. Even for the experts in the field, consumer behavior is difficult to predict. The concept of marketing stresses on creating a marketing mix that satisfies the consumers and therefore, it is necessary to study about consumers' interest and expectations on products.

While understanding consumer buying behavior, it is essential to know why consumers make purchases that they make. Different physical attributes of products influence different people in different ways. For example, colour variations are influenced by fashion and the trends in the industry (Singh, 2006). Colour preferences do not stay same forever and change over time (Jacobs *et al.*, 1991, Schloss *et al.*, 2015). Since the preferences change with time, it is crucial to perform the forecasts time to time (Liu *et al.*, 2013). Colour has become a new idea to sell a product but how to use it still an unexplained issue (Pelet, 2015). Brands with different colour options in products, appeal to personal tastes and edge out their competition with other brands. Now the question is how does an industrial designer or the marketer know the colour trends apart from his own personal observation or vision? It is a practice to approach colour consultants and there is also marketing data that can help forming a colour palette. For any product, while choosing from a range of colours, there is always a bit of uncertainty about a few colours as much as the confidence that is on a few other colours. This is due to the fact that human perception towards colours is to a great extent psychological and complicated. Thus, it is delicate to choose a perfect colour palette

even after an in- depth survey. The same story goes with all other physical attributes of a product such as form or texture.

From the existing literature, it is well established that colour and form are most influential compared to other physical attributes and are used as a marketing tool but the academic research on colour and form is scarce (Bagchi and Cheema, 2012; Labrecque *et al.*, 2013; Kumar, 2016). Some studies earlier have focused on topics relating to colours such as packaging (Pantin-Sohier, 2009), brand logo (Labrecque and Milne, 2012), advertising (Lichtlé, 2007) and atmospherics (Bellizzi and Hite, 1992; Chebat and Morrin, 2007). Product form plays a decisive role in purchase decision since it can evoke user experience but the intensions aroused by product form has not been investigated through empirical studies (Ding *et al.*, 2016). Very little is known about how colour and form affect consumers' preference of a product and if the preference among the colour and form differ across different consumer products. Therefore, the present research focuses on studying the influence of colour and form of products during product selection process among different categories of products.

In case of consumer products, the young generation are a potential population in making purchases (Bakewell and Mitchell, 2003; Carter, 2011; Kotler and Keller, 2011; Chaet, 2012; Akcay *et al.*, 2012; Akcay, 2012) and this age group has more experience in purchasing consumer products (Zeugner-Roth *et al.*, 2008). Belk *et al.* (2003) state that youthful samples value consumption as the most potential source of fulfillment. It is found that materialism plays an important factor in purchasing decision and young generation are of materialist nature (Demirbag *et al.*, 2010). The young generation is brand conscious, they pay great attention to the image they are portraying by carrying a particular product and are eager to try new and interesting products that are launched in the market (Bakewell and Mitchell, 2003). Study of young consumers' behaviour is very important, as young consumers are highly "experimental" segment compared to the older adult consumers (Grant and Walsh, 2009).

Young-adult participants (UG and PG students from a premier Indian higher education institution) were selected as the sample whose age ranged from 18 to 25 years. This sample was cosmopolitan in nature as the student participants were from different states of India with diverse socio-economic and cultural background. Maximum variation purposive sampling (Marshall, 2009) was adopted to make sure

there is variation among participants in terms of their socio-economic as well as cultural backgrounds. Literature confirms that there are several aspects and conditions that influence consumer in choosing a product (Kotler and Keller, 2011). Involving all of them in the study would cause difficulty in yielding results of the focused aspects. Thus, this research work was delimited to performing the studies in a laboratory setup, on a certain student population and to a particular age group.

6 Aims and Objectives

The aim of the present research was to understand the choice making of products based on two important physical attributes, i.e. colour and form among a few daily consumer products by the Indian student population. To achieve this aim, following objectives have been set.

- *To study the preference of colour among a few primary colours*
- *To study the preference of colour and form in a set of products with non-recognizable function*
- *To study the preference of colour and form in a set of products with recognizable function*
- *To study the difference (if any) in preference of colour and form between products with non-recognisable function and products with recognisable function*
- *To study the preference of colour and form between two different categories of products with recognisable function*
- *To establish research methodology to study colour and form preference of products based on visual scanning behaviour*

7 Hypotheses of the Research

A few assumptions have been formulated prior to conducting experimental research. Attempts were made to prove whether these statements are correct or incorrect. Following were the three hypotheses for the intended research:

H1: *Colour is more significantly correlated with product choice as compared to form.*

It is well known that colour and form are the two most important cues for visual attention towards a product but we do not know ‘which is more influential (or correlated with) in product selection between colour and form’. Hence, it has been assumed that colour might be dominant over form during product choice making.

H2: *Colour and form selection significantly varies across different categories of products.*

It is assumed that preference of colour and form is different a) between products with non-recognisable function and products with recognisable function b) between two different categories of products with recognisable function.

H3: *There is significant variation in the preference of colour and form of a product while it is presented on-screen and presented in physical mode.*

It is assumed that colour and form perception of an individual is different when perceiving colour and form on-screen against while perceiving in real-life physical mode. Therefore, it is expected that there must be some difference in preference of colour and form in product selection while it is presented on a screen and presented physically in real-life.

8 Research Methodology and Research Framework

The research focuses on understanding the influence of colour and form of products during choice making of consumers across different product categories. This study required empirical data concerning the level of consumers' preference for colour and form while choosing the products in order to verify hypotheses. The study undertaken uses a qualitative and quantitative explanatory research methodology involving statistical analysis of data to find the influence of colour and form (physical attributes) in product choice. The research methodology adopted in this thesis to achieve the desired goal is depicted in Figure 1.10.

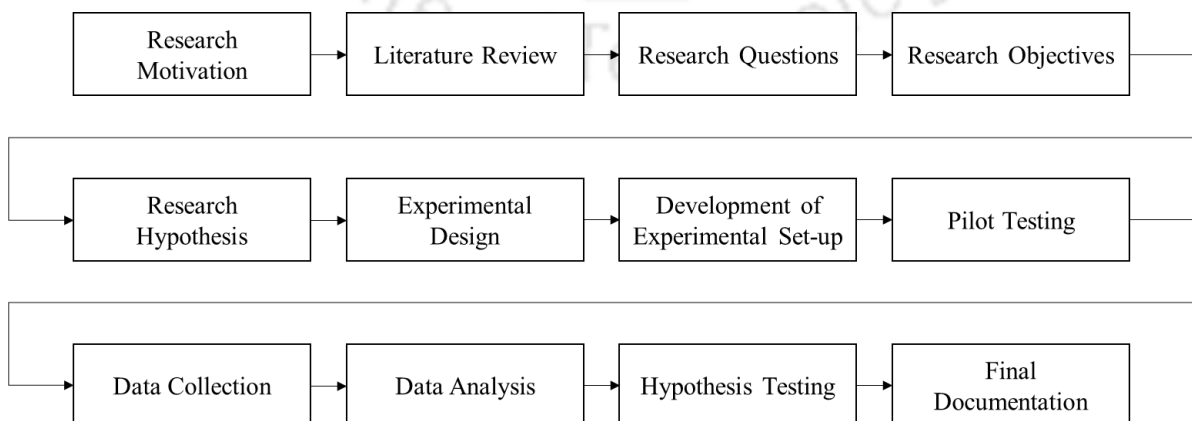


Figure 1.10 Research Methodology

The framework of this research (shown in Figure 1.11) describes the significant stages regarding the source of data, how it was collected and analysed. Participants were chosen to represent young Indian population. Maximum variation purposive sampling was adopted to ensure a wider set of demographic variations of the participants in terms of their socio-economic as well as cultural backgrounds (Marshall, 2009). The sample size in the present research was close to the sample size that was chosen in similar studies by other researchers (Nevalainen and Sajaniemi, 2004; Duchowski *et al.*, 2005; Zambarbieri *et al.*, 2008). Gender split among participants is according to the Census of India, 2011(which is still active), gender ratio of Indian population is 48.6 % of females and 51.4% of males.

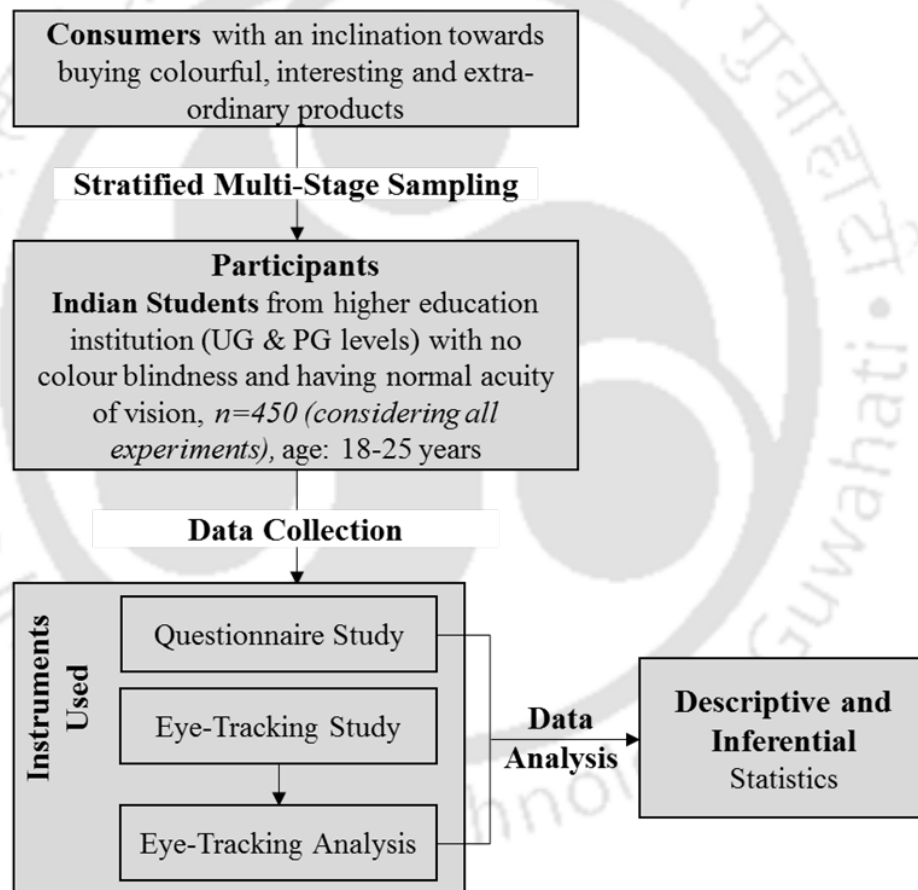


Figure 1.11 Brief of Research Framework

As a prerequisite for conducting the subsequent colour and form studies of products, a few initial set of experiments were performed to observe the colour choices among the primary colours from RBY colour model through presenting colour patches. This was a pilot study done before involving products. This prerequisite study was attempted to figure out about eye tracking parameters and various factors for experimental setup for

eye tracking study and also to determine the appropriate audience. In this study, it was attempted to understand the relationship (if any) between colour preference and visual attention. This was essential because empirical studies with products as stimulus in the present research depend on eye tracking experimentation.

In the present research, products have been broadly categorized under two groups. One is product or object with non-recognizable function (product category-1) and another is product with recognizable function. When product category-1 was presented as stimulus, it was instructed clearly to the participants that they do not hold any particular purpose. Under the second category, USB Flash drives (product category-2) and Tea Cups (product category-3). In other words, the products have been categorized based on whether the appearance of the product is capable in determining its way of use. Categorization of the products was done through difference in functionality. The intension in choosing this pattern of categorization / grouping was to keep the purpose of the product obvious to the participants without ambiguity of any sort. It helped the consumer (participants) to focus on choice making with respect to the physical attributes of products.

USB Flash drives (Product category-2) and Tea cups (Product category-3) are two products used by most students (participants of this research) on a daily basis. These two products (Product category-2 and Product category-3) are used in two completely different contexts for different purposes therefore there is no doubt in understanding the functionality of the products. Moreover, functionality or use purpose were kept well informed to the participants. This was done to eliminate attention/curiosity of participants on the affordance/ functionality aspect of the product and to focus only on the primary task of choosing the product based on its colour and/or form (not on any other attributes of products). The different studies involved in the current thesis are shown in figure 1.12.

Visual attractiveness is an important criterion for enriching the product value in the market through the product appearance (Bloch et al., 2003; Creusen and Schoormans, 2005; Hassenzahl, 2004; Moshagen *et al.*, 2009) and it is capable of influencing product purchase intention positively (Wells *et al.*, 2011).

Visual attractiveness is an essential factor in product design because it is closely related with the product's appearance. It is well proved that visual appearance of products plays a significant role in determining consumers' product choice (Creusen and Schoormans, 2005) and thus commercial success (Crilly et al., 2004). Literature

reveals that products which are more visually attractive, grab more attention towards it when many products are placed simultaneously in shopping mall environment (Tonkin *et al.*, 2011). Cognitive scientists and eye movement researchers agree that the eye movement data reflect the participants' cognitive state (Sun *et al.*, 2014). It was reported that the eye location and covert attention overlap (Rayner, 2009). Therefore, evaluation of visual attention analysis is necessary when aiming at product appearance design.

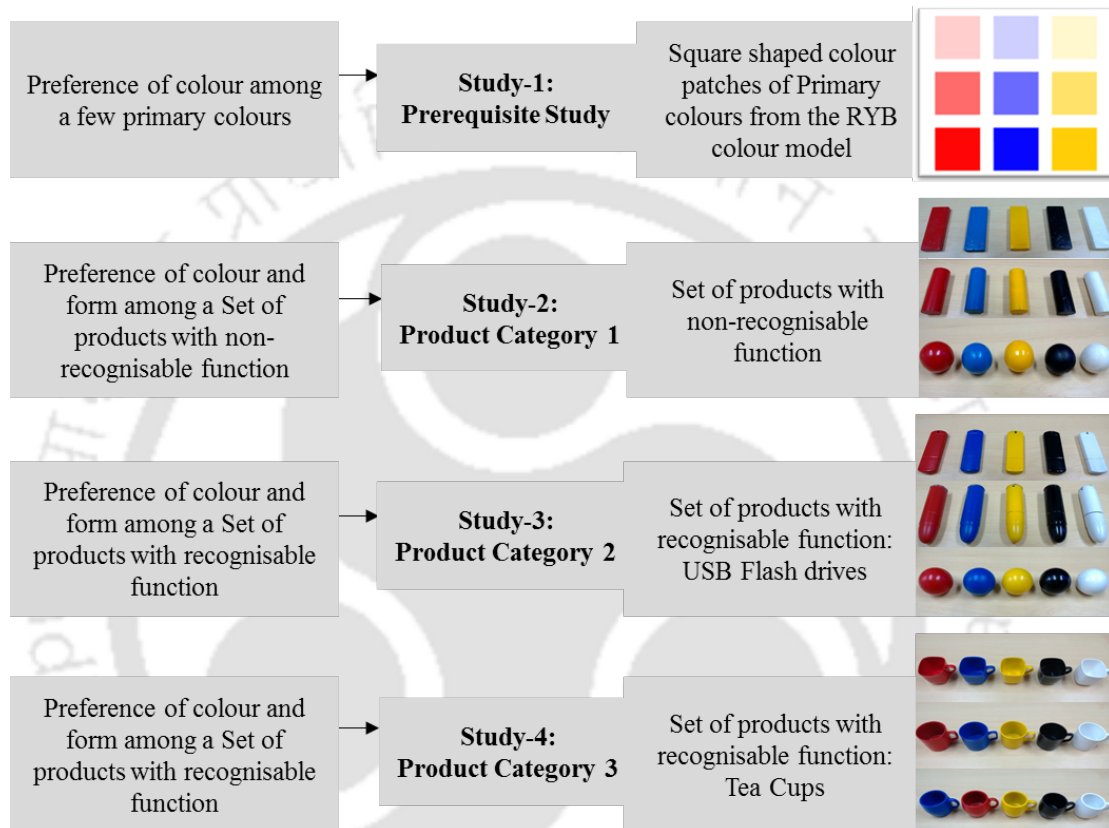


Figure 1.12 Visual Stimuli for Different Studies

It is known from the literature that colours and shapes/ forms convey about 80% of all visual communication (LaCroix, 1998). As the present thesis is on study of colour and form preference for the product choice, visual attention analysis of the participants was felt necessary to understand the correlation between visual scanning of the product and its selection. Following the literature review, it is found that different neurocognitive techniques are in use in the fields of product and/ brand evaluation. Commonly used neurocognitive techniques for product or brand evaluation are electroencephalography (EEG), magnetoencephalography (MEG), functional magnetic resonance imaging (f-MRI), Eye-tracking and galvanic skin response (GSR). It is true that many researchers adopted f-MRI for product/brand evaluation but there are also

good number of reported studies (Neto et al., 2011; Morin, 2011; Windhager et al., 2010, Singh and Das, 2010; Chowdhury et al., 2013) which adopted eye-tracking technique as evaluation tool. In comparison to eye-tracking, f-MRI is a much costlier technique. Eye-tracking device is one of the most effective in the context of visual behavior analysis (Duchowski, 2007).

Different eye-tracking variables are related to visual attention. Among different variables pupil diameter, fixation counts, first fixation duration and fixation, blink duration, blink count, time/duration are the quantitative measure of visual attention whereas, visual scan path, heat map and focus map are qualitative measures of visual attention (Ahlstroma and Friedman-Berg, 2006; Duchowski, 2007). The correlation between eye-tracking gaze data and product attribute was established by Kukkonen (2005).

Eye tracking variables like fixation duration and fixation counts are commonly used metrics for evaluation of area of interest (AOI) and perception of viewers (Chowdhury *et al.*, 2012). Earlier research findings demonstrated that longer the participants' eyes fixated on a target, the more detailed information could be gathered. The fixation count was an index of knowing the number of the perceptual times for a specific type of stimulus (Tseng *et al.*, 2013). Longer fixation durations correlate with more concentrated perceptions (Nuthmann *et al.*, 2010). More fixation counts per area of interests (AOI) on an object means more interest or attention towards this object (Chowdhury *et al.*, 2013). Fixation frequency and fixation duration per AOI were analysed to observe the effect of attention on product choice (Chen and Pu, 2014).

To understand the choice making of the consumer while they are looking at the product's physical appearance, study of visual scanning behavior and visual attention analysis is very useful (Gulliver and Ghinea, 2004). Questionnaire study could be a method to correlate visual attention related variables and product choice in a quantitative manner. Hence, in the present research, eye-tracking technique has been adopted along with the traditional questionnaire based consumer's preference evaluation. The flow of whole thesis work was systematically presented in 'Figure 1.13'.

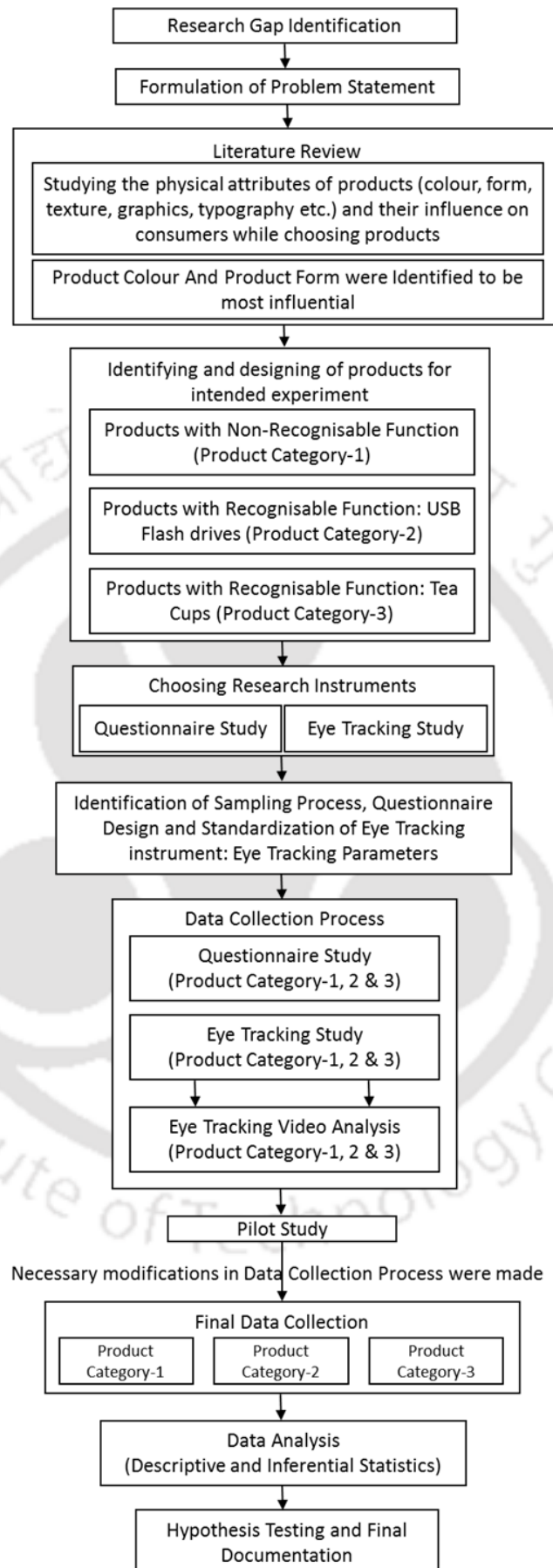


Figure 1.13 Diagrammatic Representation of detailed research methodology followed in the thesis

9 Implications of the Thesis

1. It is expected that present thesis would highlight about colour (primary colours from RYB colour model, Black and white) and form (basic geometric forms: cuboid, cylinder and sphere) preference of Indian consumers (Undergraduate and Postgraduate Students from a premier educational institution) towards a few consumer products.
2. The methodology involving both qualitative (questionnaires) and quantitative (eye tracking technique) techniques, work flow, evaluation techniques etc. adopted in the current research can be used by other researchers to conduct investigations in similar direction.
3. Information regarding colour and form preference for a few consumer products, developed from present thesis can be used in the academic studies and even for further research.
4. In addition, eye tracking based colour and form evaluation strategy could be utilized by consumer researchers for attractiveness evaluation of the product and could ensure the market acceptance of products. Therefore, the outcome can be used as a manual or as product appearance evaluation guide.

10 Layout of the Thesis

As per the content of the work and chronological order of the various activities during the research, the thesis is divided into six chapters as mentioned below:

- Chapter I: Visual Attributes of Products and its influence on Consumers in Product Choice: Introduction and Literature Review
- Chapter II: Study on the preference of colour among a few primary colours
- Chapter III: Study on the preference of colour and form in a set of products with non-recognisable function (Product category-1).
- Chapter IV: Study on the preference of colour and form in a set of products with recognisable function (Product category-2: USB Flash drives).
- Chapter V: Study on the preference of colour and form in a set of products with recognisable function (Product Category-3: Tea cups).
- Chapter VI: General discussion and conclusion of the overall thesis

10.1 Hypotheses and objectives distributed in various chapters

Table 1.1 Hypotheses and objectives distributed in various chapters

Hypothesis	Objectives	Chapter
1. <i>Colour is more significant, correlated with product choice compared to form.</i>	- To study the preference of colour and form in a set of products with non-recognisable function (Product Category-1). - To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product Category-2) and Tea cups (Product Category-3).	3, 4, 5
2. <i>Colour and form selection significantly varies across different categories of products.</i>	- To study the preference of colour and form in a set of products with non-recognisable function (Product Category-1). - To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product Category-2) and Tea cups (Product Category-3).	3, 4, 5
3. <i>There is significant variation in the preference of colour and form of a product while it is presented on-screen and presented in physical mode.</i>	To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3).	5

10.2 Overview of all the chapters

Chapter-1

This chapter features background of the research area and the current research issues are highlighted. This chapter delineates a state of the art literature review that was carried out concerning consumers' product choice with respect to physical attributes (colour, form, texture, typography, graphics etc.) of products. Physical attributes play as determinants in consumer buying behaviour and visual attractiveness serves as a marketing tool. Visual appearance controls consumer product evaluation and product choice making. Studies also show that product evaluation based on physical attributes may depend on the kind of product. Further, there is a need to evaluate with empirical studies regarding the significance in the difference of consumer product evaluation based on physical attributes among different categories of products. Scientific studies indicate that among all the physical attributes, colour and form influence the most in product choice. Role of colour and form in product selection were

explored along with description of various colour models and theories of product forms. Following literature review on visual attention capturing methods for objective evaluation of preference towards product's physical attributes, eye tracking technique has been identified to be the appropriate and efficient tool for achieving the goal of the present research. From the earlier reported studies, it is perceived that visual attributes of products have a large influence on consumer buying behaviour and it is also understood that the colour and form are most influential compared to other physical attributes of a product and thus present research focuses on these two aspects during product selection process. The study focuses on the young student population of India. Students from a higher education institution (under graduate and post graduate levels) have been chosen to be the target population. The aim and objectives of the research have been put forth in this chapter along with formulated hypotheses. Research methodology, research framework and scope of present research are laid out in this chapter. The flow of whole thesis work was systematically presented.

Chapter-2

This chapter presents an experimental study to observe the preference among primary colours. Primary colours from the RYB colour model have been chosen and three variations (variation in saturation value) of each primary colour were presented to the participants to know their preference. The intention of the study is to observe preference of primary colours with variation in their saturation value. It is difficult to choose a perfect colour by designers for a product in order to ensure wide acceptance in market. Hence, an attempt has been made to know what percentage of people have preference towards all variations (varying saturation value) of a particular primary colour (Group-1) and preference for distinctly different colours (Group-2) with variations (varying value of saturation). This study also aimed to understand relationship (if any) between colour preference and visual attention. Present experiment involved 60 participants among which 3 (5%) belong to G1 group and rest 57 (95%) belong to G2 group. It was observed that blue was the most preferred colour among the primary colours presented. B1 (variation of primary blue from RYB colour model) was the most preferred colour variation among all the primary colours and the colour variations. In the eye-tracking experiment that was performed to understand the relationship between the Area of Interest (AOI) and manual ranking done by the

participants for colour preference, B1 was found to be the most preferred colour. In a follow up experiment where the position of B1 was changed to multiple locations and presented to the participants, B1 was found to be most preferred again besides the change in position. Detailed flow of the study including the objectives, experimental design, results and a brief discussion have been presented. The instruments used for conducting the study have been discussed and the statistical data of the results have been highlighted.

Chapter-3

This chapter presents an experimental study to observe the preference of colour and form in a set of products with non-recognisable function. Detailed flow of the study including the objectives and experimental design have been presented. Five colours (red, blue, yellow, black and white) and three forms (cuboid, cylinder and sphere) were considered for the study. Fifteen products were presented (physical mode) to the participants in eight combinations for gathering responses. The instruments used for conducting the study were questionnaires and eye tracking technique. Following statistical analysis of the collected data, it was found from the questionnaire study that the most preferred product was red sphere while from the eye tracking study, it was observed that the most preferred product was red sphere and yellow sphere. From both questionnaire study and an eye-tracking study, it was found that colour is more influential than form in product selection process. The results of both have been highlighted and presented through statistical data.

Chapter-4

This chapter involves an experimental study of a set of products with recognisable function to observe the preference of colour and form. USB flash drives have been presented as the stimulus. The colours and forms of the products involved in this study were same as the previous study in chapter-3, i.e.; five colours (Red, blue, yellow, black and white) and three forms (cuboid, cylinder and sphere). Fifteen products (USB Flash drives) were presented to the participants in eight combinations. Detailed flow of the study including the objectives and experimental design have been presented. Data was collected through questionnaires and eye tracking technique. It was found from questionnaire study that the most preferred product was black cuboid. Even from the

eye tracking study, the most preferred product was found to be black cuboid. In this study involving products with recognizable function, it was found that form is more influential than colour which contradicted the observation of previous study involving products with non-recognizable function. The statistical results of both questionnaire and eye-tracking study have been presented.

Chapter-5

This chapter features an experimental study to observe the preference of colour and form in a set of products recognisable function. Products with recognisable function involved in this study were Tea cups. The colours and forms used here on products are same as Chapter-3 and 4. They were five colours (Red, blue, yellow, black and white) and three forms (cuboid, cylinder and sphere). This study involved fifteen products (Tea Cups) and were presented to the participants in eight combinations. Stimulus was presented both virtually (image on computer screen) as well as in the physical mode to study the variation in the preference due to difference in mode of presentation. The instruments used for conducting the study were questionnaires and eye tracking technique. The statistical analysis of results from Questionnaire study revealed that the most preferred product was black sphere and white sphere. In the Eye tracking study, when stimulus was presented in physical mode, the most preferred product was found to be black sphere and when stimulus was presented in virtual mode, blue cuboid was found to be most preferred product. From both questionnaire study and an eye-Tracking study, it was found that colour is more influential than form.

Chapter-6

Consolidated findings of the research experiments have been presented in this chapter. Results of all the four studies have been highlighted and discussed in detail. All the three hypotheses have been tested and discussed. Findings from the current investigation reveal that colour and form preference varies significantly with different categories of products. It was observed that colour and form preference differs significantly when products are viewed in virtual mode and physical mode. The information regarding ‘preference of colour and form in product selection’ that has been depicted in present thesis is of importance to design studios, design schools and marketers. Further, the research methodology followed can be a guide while performing

similar research. A reference database having consumer (Indian Consumers: Undergraduate and Postgraduate students from a premier higher education institution) preferences of colour and form among different product categories is developed that can serve as a ready manual providing the design methodology to conduct similar colour and form studies. In this chapter, the key contributions of this thesis have been presented. Limitations of this research and the future scope of work have been highlighted.





Chapter 2

Study-1: To study the preference of colour among a few primary colours

Chapter abstract: This chapter presents an experimental study to observe the preference of primary colours. Primary colours from the RYB colour model have been chosen and three variations (variation in saturation value) of each primary colour were presented to the participants to know their preference. The intention of the study is to observe preference of primary colours with variation in their saturation value. It is difficult to choose a perfect colour by designers for a product in order to ensure wide acceptance in market. Hence, an attempt has been made to know what percentage of people have preference towards all variations (varying saturation value) of a particular primary colour (Group-1) and preference for distinctly different colours (Group-2) with variations (varying value of saturation). This study also aimed to understand relationship (if any) between colour preference and visual attention. Present experiment involved 60 participants among which 3 (5%) belong to G1 group and rest 57 (95%) belong to G2 group. It was observed that blue was the most preferred colour among the primary colours presented. B1 (variation of primary blue from RYB colour model) was the most preferred colour variation among all the primary colours and the colour variations. In the eye-tracking experiment that was performed to understand the relationship between the Area of Interest (AOI) and manual ranking done by the participants for colour preference, B1 was found to be the most preferred colour. In a follow up experiment where the position of B1 was changed to multiple locations and presented to the participants, B1 was found to be most preferred again besides the change in position. Detailed flow of the study including the objectives, experimental design, results and a brief discussion have been presented. The instruments used for conducting the study have been discussed and the statistical data of the results have been highlighted.

1 Introduction

Product designers are often unsure about choosing a perfect colour palette in order to capture a broad market (Gobe, 2010, Pralle, 2007). The intension of the study is to observe preference of primary colours from RYB colour model with variation in their saturation value. Present study aimed to know what percentage of people have preference towards all variations (varying saturation value) of a particular primary colour and to understand relationship (if any) between colour preference and visual attention. Through the idea of checking how much population belonged to each of the two groups, it could be possible to decide on testing the products with split colours of the colour model or just knowing the preferences from primary colours will suffice in evaluating about the colour choices of consumers.

2 Objectives

Generally, in one hand there are people (Group-1) liking a colour and passionate/ obsessed about all variations of that particular colour and also hardly liking any other distinct colour. On the other hand, some people (Group-2) like distinctly different colours with variations (variation in value of saturation). Thus, on a broad-spectrum, based on colour preferences, there are two groups of people in a population. Every single person obviously will fall into one of these two categories (either in Group-1 or in Group-2). The present study (Study-1) was conducted to address the following objectives:

- a. To understand how saturation values of particular primary colours affect colour preference among selected primary colours.
- b. To understand whether majority of the people (in terms of percentage of participants under study) like a single colour or different colours with the variation of saturation value.
- c. To figure out eye tracking parameters and various factors for experimental setup for eye tracking study.
- d. To understand the relationship (if any) between colour preference and visual attention.

Through the idea of checking how much population belonged to each of the two groups, it could be possible to decide on testing the products (in the study- 2,3 and 4) with split colours of the colour model or just knowing the preferences from primary colours will suffice in evaluating about the colour choices of consumers.

3 Experiment-1

Aim of this experiment was to segregate people (participants for experiment) into two groups, namely G1 and G2. Where, G1 was the group of people who like one specific colour and are passionate/obsessed about all variations (varying value of saturation) of that particular colour and do not like any other distinct colour; G2 was the group of people who like different colours depending on saturation. If a participant liked all given variations of a single primary colour then he/she was considered to be in G1 and if the participant liked distinctly different colours variations (depending on saturation value) of other primary colours, then he/she was considered to be in G2.

3.1 Experimental Design

Colors are represented by three dimensions (Munsell, 1966): hue, saturation, and brightness. A color's hue (gradation or tonality) is the pigment of the color which

perceived in categories (eg, blue, yellow, red) (Gorn *et al.*, 2004). The present study adopts this typology.

Experiment involved a visual presentation with colour-codes and respondents were asked to choose their preferred colours. Colours chosen for the presentation were the historical set of subtractive primary colours: Red, Yellow and Blue (Feisner, 2006; Fraser and Banks, 2004) from RYB colour model. Three variations of each primary colour were chosen. Hue and brightness of each colour were kept constant while their saturation value varied (Table 2.1). Three visual presentations (for 3 different colours, Red, Yellow and Blue) were made with 7 combinations of different colour saturations in each using Microsoft PowerPoint. For example, a presentation with red as the main colour comprised of combinations of it with others i.e., R0 B0 B1 B2, R0 Y0 Y1 Y2, R1 B0 B1 B2, R1 Y0 Y1 Y2, R2 B0 B1 B2, R2 Y0 Y1 Y2 and R0 R1 R2. Similarly, other two presentations were made (Table 2.2). The size of each colour patch was maintained to be 40mmX40mm. These combinations were chosen to test the liking among the verbally chosen colour and other colours.

Table 2.1 Colour variations of primary colours (RYB colour model) by varying saturation

Colour variations	R0	R1	R2	B0	B1	B2	Y0	Y1	Y2
									
Hue	0	0	0	240	240	240	48	48	48
Saturation	20	60	100	20	60	100	20	60	100
Brightness	100	100	100	100	100	100	100	100	100
Colour Codes from Adobe	#ffeccc	#ff6666	#ff0000	#ccccff	#6666ff	#0000ff	#fff5cc	#ffe066	#ffcc00

Table 2.2 Various combinations of colours under the study

	Red as main colour	Blue as main colour	Yellow as main colour
Colour combinations presented	Slide-1	R0 B0 B1 B2	B0 R0 R1 R2
	Slide-2	R0 Y0 Y1 Y2	B0 Y0 Y1 Y2
	Slide-3	R1 B0 B1 B2	B1 R0 R1 R2
	Slide-4	R1 Y0 Y1 Y2	B1 Y0 Y1 Y2
	Slide-5	R2 B0 B1 B2	B2 R0 R1 R2
	Slide-6	R2 Y0 Y1 Y2	B2 Y0 Y1 Y2
	Slide-7	R0 R1 R2	B0 B1 B2
			Y0 Y1 Y2

The experiment was performed on 60 students (30 males and 30 females of age group 18-25 years) from a premier Indian higher education institution (under graduate and post graduate levels). All of them were with normal acuity of vision and without any degree of colour blindness. Colour blindness was tested by performing Ishihara colour test (Ishihara, 1981) and Snellen's chart (Snellen, 1862) was used to check the visual acuity of participants. The experiment was performed at a comfortable room temperature and ideal ambient illumination of about 24 °C (75 °F) and 500 lux respectively (Bridger, 2003; Sanjog et al., 2013). The computer screen used for experiment was of LG TFT monitor with resolution of 1600 by 900 pixels and screen size 17 inches diagonally. Viewing distance was maintained at one meter (Jaschinski-Kruza, 1991).

At first during the experiment, each participant was asked verbally to choose one among the primary colours: red, blue and yellow. Participants were then instructed about the screen test, to choose one among the colour patches presented on the screen. They were asked to mention the code against the colour patch they choose from the presentation slides in the sheet given to them with a printed table. Then, the participants were made to sit in front of computer screen in such a way that he/she faced the middle of the screen and the visual stimulus was presented depending on the colour chosen by the participant. For example, if the participant chose red, then the presentation contained R0 B0 B1 B2, R0 Y0 Y1 Y2, R1 B0 B1 B2, R1 Y0 Y1 Y2, R2 B0 B1 B2, R2 Y0 Y1 Y2 and R0 R1 R2 combinations. Seven combinations were presented in seven different slides and every slide was presented for 10 seconds. There was a gap of two seconds after each slide and the participant was asked to write down her/his choice (the colour code) amongst each combination on a given printed table.

3.2 Results and Observations

Present experiment involved 60 participants among which 3 (5%) belong to G1 group and rest 57 (95%) belong to G2 group. Among the 3 participants in G1 group, one was male who selected all variations of the colour blue. One of two females who selected all variations of red colour and the other chose all variations of blue. When participants were asked verbally, 16 chose red, 33 chose blue and 11 chose yellow. Thus, blue in general (without considering saturation value) was the most preferred colour among the entire sample population under study.

From the slides which presented different combination of colour variations (different saturation value), B1 was observed to be the most preferred. Considering the three variations of the three primary colours under study, it was observed that participants selecting blue were 37% while 33% of the participants selected any of the red variations, followed by yellow which was 30%. Looking into preference towards individual colour variation, experimental result indicated that 16% of participants selected B1, 14% selected R0, 12% selected R1, 11% selected B0, 10% selected B2, 10% selected Y0, 10% selected Y1, 9% selected Y2 and 8% selected R2 among all the colour variations presented. The observed data is summarized in Figure 2.1.

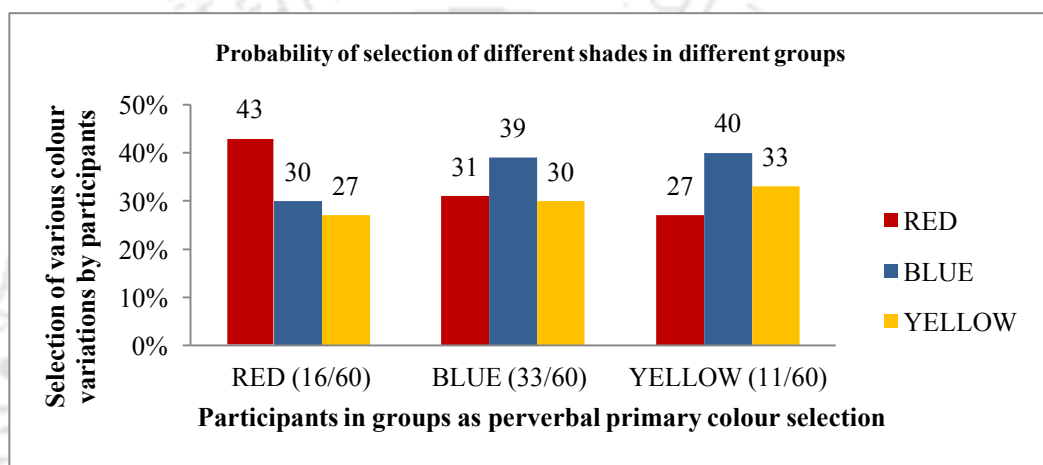


Figure 2.1 Participants' preferences of colour variation within each group of verbally selected primary colour

3.3 Discussion

From experiment-1, it was evident that there was more number (95% of total) of people (in G2) liking distinctly different colours with variation in saturations. It was also noticed that blue was the most preferred colour (37%) with highest choice for B1 (16%). Interestingly, it was observed that participants who selected yellow when verbally asked to choose between red, blue and yellow; selected colour variations of blue more than colour variations of yellow during the screen based test (shown in Figure 2.1). This may be due to the fact that the value of saturation of yellow they imagined might not have matched with the variations of yellow that were presented in the stimulus. Thus they chose colour variations of blue over variations of yellow. It indicates that selection of colour variation is a complex psychological phenomena and it is very much dependent on saturation value of a particular colour hue (Kuller *et al.*, 2006; O'Connor, 2011).

4 Experiment-2

It has been reported that people look more or pay more visual attention on their area of interest in a scene/ frame of viewing (Wedel and Pieters, 2006; Pieters and Wedel, 2007). In Experiment-2, eye-tracking was performed to understand the relationship between the Area of Interest (AOI) of the participant within the visual stimulus presented and manual ranking done by the participants for colour preference. This experiment involved a visual presentation with colour variations (shown in Table 2.1).

4.1 Experimental Design

Visual stimuli were prepared on a single slide (using Microsoft PowerPoint) containing all the nine colour variations as shown in Figure 2.2. The experiment involved 20 volunteers (10 males and 10 females) and the criteria of choosing participants was same as in Experiment-1. All measures adopted for Experiment-2 were same as was in Experiment-1.

Each participant was briefed regarding the nature of the experiment and was instructed to sit in front of the display screen with the eye tracking setup (SMI iViewX-HED Eye tracking system (Monocular: Right eye active) was used). At first each participant was asked to fix their eyes at a small black sphere positioned in the middle of a blank (white) slide presented on computer screen. Next, stimulus was presented for 45 seconds and the participant was asked to view the presentation. During this visual presentation, participant's eye movements were recorded. Following completion of eye movement recording, participant was given a printed table containing nine cells to rank each colour variation from 1 to 9. After recording and saving the video data of each participant, scan path and heat map on area of interest (AOI) were evaluated using SMI Be-gaze 0.3 software. Same procedure was followed for recording the eye movement of all the participants.



Figure 2.2 Slide with nine colour variations displayed during eye tracking

4.2 Results and Observations

Eye tracking study revealed that mean fixation count of 20 participants was maximum for colour variation-B1 (mean fixation count=11). Mean fixation time was also maximum for B1 (15608 ms). It indicated that B1 was the most preferred colour. This is because people pay more visual attention to their preferred colour (relatively more preferred colour). Therefore, the fixations duration and fixation counts are more on the preferred colors (Lee *et al.*, 2005). Images of ‘heat map’ and ‘scan path’ of a random frame from recorded video during experiment-2 are shown in Figure 2.3.

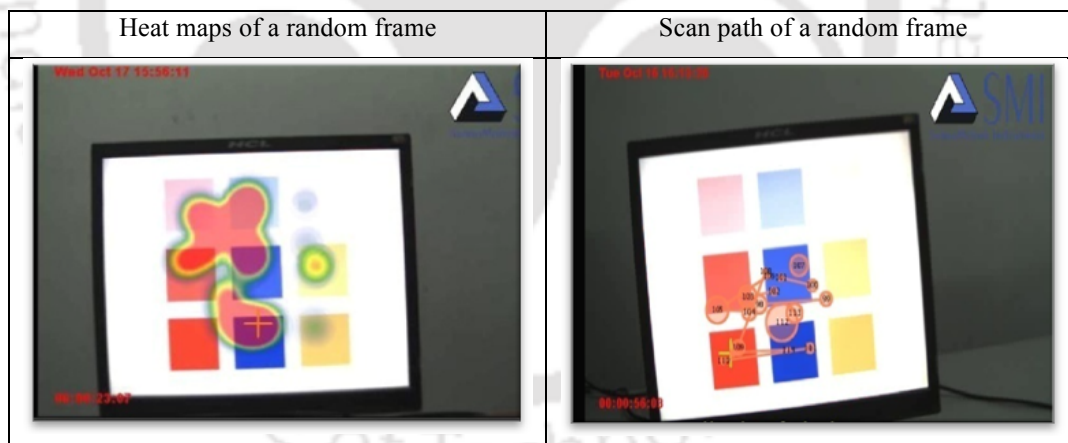


Figure 2.3 Illustrations of eye tracking video data (heat map and scan path)

Heat maps represent higher density (with higher frequency and duration) of gaze fixations whereas scan paths represent sequence of fixation points (saccades) connected with lines. Mean fixation count, mean fixation time and scores from the manual ranking of each individual colour variations were compared and it was found that there were maximum fixation counts, fixation duration as well as the scores of manual rankings for B1. Also other colour variations did not show similar trend in order of ranking (Table 2.3). Eye tracking data showed that the second maximum

mean fixation counts and mean fixation time were on B0 whereas in the manual ranking scores, second position was for R0. This variation might be due to attention grabbing potential of blue colour over a lighter red colour variation. Average values of all variables e.g. fixation count, fixation time and manual ranking were normalized by assuming maximum values of these three parameters as 100. The normalized values of mean fixation count, mean fixation time and the average of manual ranking for each individual colour variations are graphically represented in Figure 2.4.

Table 2.3 Study-1: Position (in ascending order) of various colour variations as per different criteria (ranking score, fixation time and fixation count)

Position	Ranking Score	Mean Fixation Time (ms)	Mean Fixation Count
1 st	B1, 6.15	B1, 15608	B1, 11
2 nd	R0, 5.55	B0, 7994	B0, 7.95
3 rd	B0, 5.2	R1, 3810	R1, 5.75
4 th	B2, 5.1	Y0, 3125	Y0, 5.45
5 th	R1, 5.1	B2, 3120	Y1, 4.7
6 th	Y1, 4.95	Y1, 2538	B2, 4.45
7 th	Y2, 4.75	R2, 2420	R0, 4.25
8 th	R2, 4.6	R0, 2306	R2, 3.85
9 th	Y0, 3.6	Y2, 1294	Y2, 2.5

There were observable differences in mean values of manual ranking for all color variations. One-way ANOVA was adopted to check significant variation among different colour variations for visual attention related eye-tracking variables (mean fixation count and mean fixation time). In ANOVA, different color variations were considered as independent variables and mean fixation count and mean fixation time were considered as dependent variables. Observation from statistical analysis (ANOVA) has been presented in Table 2.4 where $p < 0.001$ is considered as level of significance. It is clear from Table 2.4 that there is significant difference among colour variations regarding visual attention related eye-tracking variables.

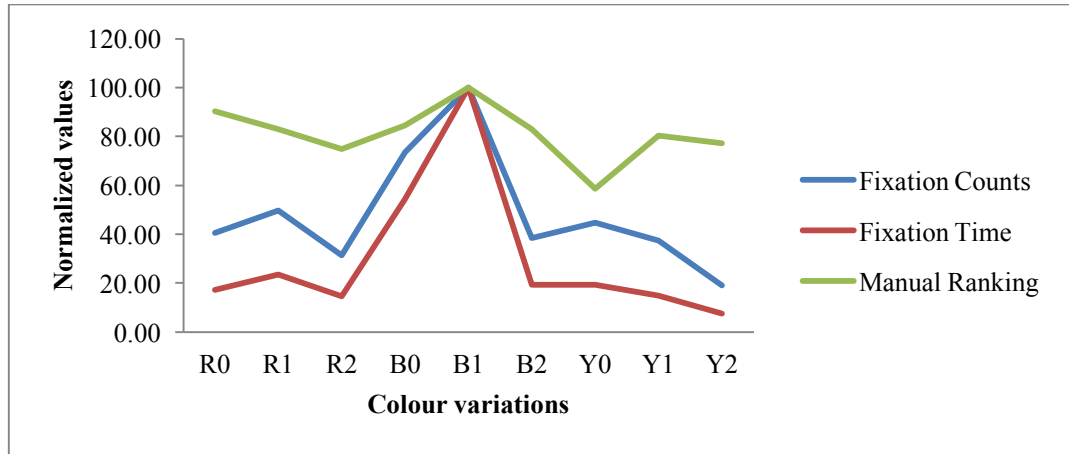


Figure 2.4 Variations of fixation counts, fixation time and manual ranking for different colour variations

Table 2.4 Study-1: Significant differences for visual attention related eye-tracking variables among different colour variations

Experiment-2	Variation type	df (s)	F-value	Level of significance
Fixation Time	Between Groups	8, 171	10.589	0.001
Fixation Count	Between Groups	8, 171	5.950	0.001

Table 2.5 Study-1: Mean fixation counts B1 ($M \pm SE$; 8.25 ± 0.987) and mean fixation time of B1 ($M \pm SE$; 11706.29 ± 2530.164), compared to other colour variations in 'Experiment-2'

Dependent variables	Colour abbreviations	M $\pm$ SE	Level of Significance	95% Confidence Interval	
				Lower Bound	Upper Bound
Fixation Time	B1	R0	0.001	7073.85	12878.95
		R1	0.001	5946.46	11751.55
		R2	0.001	6988.56	12793.66
		B0	0.001	2808.07	8613.16
		B2	0.001	6463.41	12268.51
		Y0	0.001	6460.28	12265.37
		Y1	0.001	6900.21	12705.31
		Y2	0.001	7833.60	13638.70
Fixation Count	B1	R0	0.001	2.89	7.24
		R1	0.001	1.76	6.11
		R2	0.001	3.19	7.54
		B0	0.039	.11	4.46
		B2	0.001	2.74	7.09
		Y0	0.001	1.99	6.34
		Y1	0.001	2.55	6.90
		Y2	0.001	4.20	8.55

When LSD (Least Significant Difference) test was conducted to see the significant difference between mean values of fixation count and fixation time of different colour variations, it was observed that mean fixation counts and mean

fixation time were significantly higher in case of B1 in comparison to other colour variations (shown in Table 2.5). Observations from Table 2.5 infer that most participants significantly liked B1 than the other set of colour variations.

4.3 Discussion

From both, experiment-1 and experiment-2, it was found that most participants had higher preference towards the colour blue and yellow was least preferred among the historic primary colours red, blue and yellow. Moreover, eye-tracking results of experiment-2 demonstrated that there were significant difference among colour variations in relation to visual attention related eye-tracking variables like mean fixation count and mean fixation time. It was also noticed that most participants significantly liked B1 than rest of colour variations.

5 Experiment-3

Blue variation B1 was placed in the middle of the stimulus presented in Experiment-2 (as shown in the figure 2.2). Eye tracking results showed that B1 was most visited. Studies of previous researchers indicate that people generally look at the middle during onscreen presentation (Gibbs and Bernas, 2009). Thus it was not clear whether B1 was most visited due to preference by the participants or due to its central position in the stimulus material. To get the answer, Experiment-3 was conducted. It involved eye-tracking to study if the preferences (B1) changed with relative change in position of the colour variations in the presentation.

5.1 Experimental Design

Visual stimulus was presented using Microsoft PowerPoint. It comprised of visual presentations with nine colour-variations and having B1 in nine different positions, in nine different slides. The experiment involved 20 volunteers (10 males and 10 females) and the criteria of choosing participants was same as in Experiment-1. Same measures were adopted for Experiment-3 as was in Experiment-2. Experimental procedure for experiment-3 was similar to experiment-2 with minor modifications. In experiment-3, nine slides were presented as visual stimuli instead of one slide as in experiment-2. Each slide was displayed for 45 seconds and there was a blank (white) slide containing a small black sphere positioned in the middle for

repositioning the eyes to the middle of the slide (for 2 seconds). During this visual presentation, participant's eye movements were recorded. Manual ranking for colour preference in each slide was not performed in experiment-3 as it was not intended as an objective of the experiment.

5.2 Results and Observations

From Experiment-3, eye tracking study revealed that mean fixation counts of 20 participants were maximum for B1 (value=10) and mean fixation time was also maximum for B1 which was 4476 ms. Therefore, it can be said that B1 is the most preferred colour irrespective of its position. Average values of fixation count and fixation time for individual colour variation were normalized by assuming maximum values of these two variables as 100 and presented in Figure 2.5.

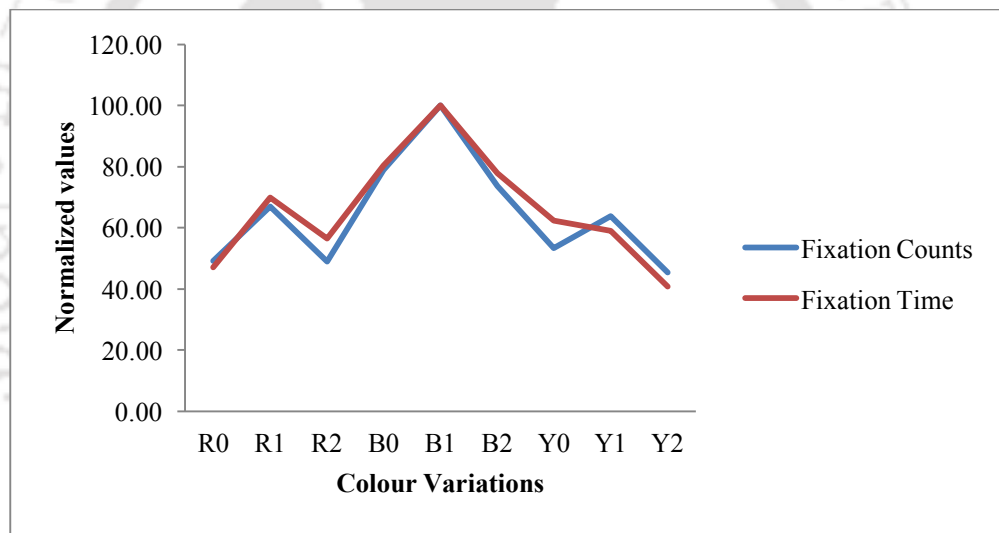


Figure 2.5 Normalized values of fixation counts and fixation time for different colour variations

One-way ANOVA test was conducted with colour variations as independent variables and variables related to visual attention (fixation count and fixation time) as dependent variables. Table 2.6 shows that there is a significant difference in preference among different colour variations used in experiment 3. When LSD test was conducted to see if there was a significant difference between selections of colour variations by the participants, it was inferred that mean values of fixation count and fixation duration of B1 had significant difference compared to all other eight variations even when its position was changed (shown in Table 2.7).

Table 2.6 Study-1: Significant Difference in fixation time and fixation count among different colour variations

Dependent variable	Variation type	df (k, N)	F-value	Level of significance
Fixation Time	Between Groups	8, 171	7.759	.001
Fixation Count	Between Groups	8, 171	2.662	.009

Table 2.7 Study-1: Mean fixation counts of B1 ($M \pm SE$; 10.16 ± 1.77) and mean fixation time of B1 ($M \pm SE$; 4476.18 ± 620.15), compared with other colour variations in Experiment-3

Dependent variable	Colour abbreviations	M±SE	Level of significance	95% Confidence Interval		
				Lower Bound	Upper Bound	
Fixation Time	B1	R0	2104.06±313.78	0.001	998.82	3745.41
		R1	3131.55±465.90	0.055	-28.67	2717.92
		R2	2527.20±477.16	0.006	575.68	3322.27
		B0	497.35±68.91	0.001	2605.53	5352.12
		B2	3487.89±609.62	0.157	-385.00	2361.59
		Y0	2787.65±854.23	0.016	315.24	3061.83
		Y1	203.18±41.93	0.001	2899.71	5646.29
		Y2	1828.60±377.41	0.001	1274.28	4020.87
Fixation Count	B1	R0	4.99±0.67	0.001	2.08	8.24
		R1	6.81±0.80	0.033	.27	6.43
		R2	4.98±0.68	0.001	2.09	8.26
		B0	8.01±1.05	0.171	-.93	5.23
		B2	7.49±1.33	0.090	-.42	5.75
		Y0	5.43±1.15	0.003	1.64	7.81
		Y1	6.47±1.26	0.020	.59	6.76
		Y2	4.61±0.71	0.001	2.46	8.62

The results from the eye tracking data (Table 2.7) showed that participants liked B1 significantly ($p < 0.05$) more than rest of the colours. However, there was no significant difference when mean fixation time of B1 was compared with that of R1 and B2. Mean fixation count of B1 was also not insignificant while compared with B0 and B2. Therefore, from observation of experiment-3, it can be interpreted that B1 was the most liked colour irrespective of its placement in the stimulus. When one-way ANOVA was conducted combining the eye tracking results from both Experiment-2 and Experiment-3, once again it was found that there was significant difference in visual attention due to different colour variations (shown in Table 2.8) and B1 was the most attractive compared to all the other colour variations (Table 2.9).

Table 2.8 Study-1: Significant Difference in fixation time and fixation count among different colour variations in combined data of Experiment-2 and 3

Dependent variable	Variation Type	df (k, N)	F-value	Level of significance
Fixation Time	Between Groups	8, 351	11.143	0.001
Fixation Count	Between Groups	8, 351	6.713	0.001

Table 2.9 Study-1: Mean fixation count of B1 ($M \pm SE$; 9.20 ± 1.01) and mean fixation time of B1 ($M \pm SE$; 8091.24 ± 1410.03), compared with other colour variations in combined data of Experiment-2 and 3

Dependent Variable	Colour abbreviations	M±SE	Level of significance	95% Confidence Interval		
				Lower Bound	Upper Bound	
Fixation Time	B1	R0	1916.98±258.780	0.001	4447.92	7900.60
		R1	2994.42±320.92	0.001	3370.47	6823.16
		R2	2171.19±333.49	0.001	4193.70	7646.38
		B0	3246.51±799.96	0.001	3118.38	6571.06
		B2	2914.11±446.73	0.001	3450.79	6903.47
		Y0	2565.56±512.91	0.001	3799.33	7252.02
		Y1	1053.35±207.01	0.001	5311.54	8764.22
		Y2	1399.37±228.79	0.001	4965.52	8418.20
Fixation Count	B1	R0	4.09±0.521	0.001	3.17	7.05
		R1	5.56±0.54	0.001	1.71	5.58
		R2	3.93±0.54	0.001	3.33	7.21
		B0	6.98±0.76	0.025	.28	4.16
		B2	5.41±0.81	0.001	1.85	5.73
		Y0	4.76±0.71	0.001	2.51	6.38
		Y1	5.00±0.71	0.001	2.27	6.14
		Y2	3.24±0.47	0.001	4.02	7.90

5.3 Discussion

From experiment-3, it was observed that there was no difference in visual attention by participants towards B1 in spite of positional changes of B1 in the visual stimuli. Moreover, visual attention related variables like mean fixation time and mean fixation count were also significantly high ($p < 0.05$) for B1 in comparison to all other colour variations. Therefore, it was clear that B1 was the most preferred colour variation among all other variations considered in this study irrespective of its position in the presented stimuli.

6 Summary and Conclusion

In this study, it was observed that most people chose different variations of different colours rather than choosing variations under a single primary colour. Blue was found to be

the most preferred colour among the participants under given experimental conditions. Observation of current research corroborate with the findings of earlier researchers in the similar field. It is difficult to generalize the statement that blue is always the mostly liked colour because certainly, one blue is not necessarily equivalent in pleasantness to another blue, or one red to another red (Eysenck, 1941; Kwallek, 1996). Researchers reported that long-wavelength colours (e.g., red and yellow) have been hypothesized to be more negatively arousing than short- wavelength colours (e.g., blue and green) (Jacobs and Hustmyer, 1974).

“If one says “red” (the name of the colour) and if there are fifty people listening, it can be expected that there will be fifty reds in their minds. And one can be sure that all these reds will be very different” (Albers, 2006). Similarly, even in the present study, participants when asked verbally, picked a colour among the primary colours (red, blue and yellow) but did not always choose the same when presented with other colour variations because there were several colour variations of red, blue and yellow; and the colour in their mind did not match with the presented colours. This situation, therefore forced them to choose something other than the verbally chosen colour (Figure 2.1). This observation is very important from marketing research point of view. It indicates that colour variations for a particular product might be relooked into if product’s colour does not match with expected colour variations (saturation levels) of the intended hue by the consumers.

Chapter 3

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

***Chapter abstract:** This chapter presents an experimental study to observe the preference of colour and form in a set of products with non-recognisable function. Detailed flow of the study including the objectives and experimental design have been presented. Five colours (red, blue, yellow, black and white) and three forms (cuboid, cylinder and sphere) were considered for the study. Fifteen products were presented (physical mode) to the participants in eight combinations for gathering responses. The instruments used for conducting the study were questionnaires and eye tracking technique. Following statistical analysis of the collected data, it was found from the questionnaire study that the most preferred product was red sphere while from the eye tracking study, it was observed that the most preferred product was red sphere and yellow sphere. From both questionnaire study and an eye-tracking study, it was found that colour is more influential than form in product selection process. The results of both have been highlighted and presented through statistical data.*

1 Experiment-1: Using Questionnaires

1.1 Aim of the experiment

Aim of the experiment is to study the visual attractiveness of the presented products, to find out which is more preferred between colour and form of products during product selection. The products presented here are products with non-recognisable function (Product category-1).

1.2 Experimental Design

1.2.1 Stimulus Preparation

Experiment involved a visual presentation of products with non-recognisable function of basic forms and primary colours. There were a set of fifteen products. Primary colours red, yellow, blue from RYB colour model (Feisner, 2006; Fraser & Banks, 2004) and black, white were used. Basic geometric forms cuboid, cylinder and sphere were chosen. Simple primary colours and basic geometric forms were chosen because there is rarely reported information regarding these combinations. Since products involved in the present research have to be coated with colour pigment, RYB colour model was chosen. Black and white were also involved in the research since in most consumer products, black and white are most prevalent (Bush *et al.*, 1974; Na and

Suk, 2014). All the fifteen products were made using plastic and standard dimensions were maintained. They were coloured using spray paints. The dimensions of the products were decided after identifying the specific functional product in the second group (Product category-2) keeping in consideration that size (which is one of the physical attributes of a product) must be maintained constant between both the groups. The products were presented in eight combinations (Figure 3.1) and a questionnaire (Appendix-1A) for each combination (a total of eight questionnaires) was given to retrieve the preferences of the participants with respect to the attractiveness of the products. Psychological questionnaires with a unipolar 7-point Likert scale were used for deriving qualitative data because it was tested effective in similar research earlier (van Rompay *et al.*, 2009; Bloch *et al.*, 2009).

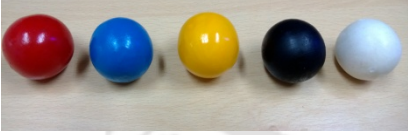
Combinations	Products Presented	Combinations	Products Presented
1 cuboid		5 blue	
2 cylinders		6 yellow	
3 sphere		7 black	
4 red		8 white	

Figure 3.1 Combinations presented in product category-1

1.2.2 Participants

50 students (26 males and 24 females of age group 18-25 years) from a premier Indian higher education institution (under graduate and post graduate levels) volunteered for the experiment. According to the Census of India, 2011(which is still active), gender ratio of Indian population is 48.6 % of females and 51.4% of males.

Therefore, for every group of 50 participants in each of the experiments, 26 males and 24 females were chosen to perform the tasks. All of them were with normal acuity of vision and without any degree of colour blindness. Colour blindness was tested by performing Ishihara colour test (Ishihara, 1981) and Snellen's chart (Snellen, 1862) was used to check the visual acuity of participants.

1.2.3 Measures

Comfortable room temperature and ideal ambient illumination of about 24 °C (75 °F) and 500 lux respectively were maintained during the experiment (Bridger, 2003; Sanjog et al., 2013). The viewing distance to observe products presented was 1.5 meters. Computer screen used for taking the questionnaire responses was of LG TFT monitor with resolution of 1600 by 900 pixels and screen size 17 inches diagonally. Viewing distance was maintained at one meter (Jaschinski-Kruza, 1991).

1.2.4 Experimental Procedure

Participants were initially instructed briefly about the experiment and each combination of products was displayed in the order shown in figure 3.1. Each combination is followed by a questionnaire where they are asked about visual appeal of products, product selection due to colour and product selection due to form.

1.3 Results and Observations

Average values of visual attractiveness, colour preference and form preference for fifteen combinations of products are graphically represented in Figures 3.2-3.9. It was observed that visual attractiveness of a particular product and its corresponding colour preference/ form preference were almost similar in maximum cases. There were observable differences in the mean values of visual attractiveness, colour preference and form preference across all the fifteen products. One-way ANOVA was adopted to check significant variation among different products for visual attractiveness, colour preference and form preference. In ANOVA, all fifteen products were considered as independent variables and visual attractiveness, colour preference and form preference were considered as dependent variables. Observation from statistical analysis (ANOVA) has been presented in Table 3.2 where $p < 0.001$ is considered as level of significance. Software used for analysis was SPSS 20. It is clear from Table 3.2 that there is significant difference among all fifteen products regarding visual attractiveness, colour preference and form preference.



Figure 3.2 Product Category1: Combination1: Five colours of cuboids

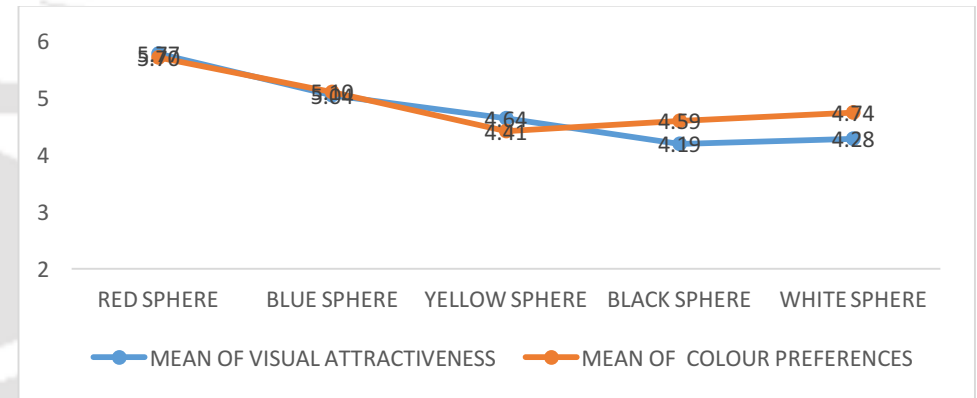


Figure 3.4 Product Category1: Combination 3: Five colours of spheres



Figure 3.3 Product Category1: Combination 2: Five colours of cylinders

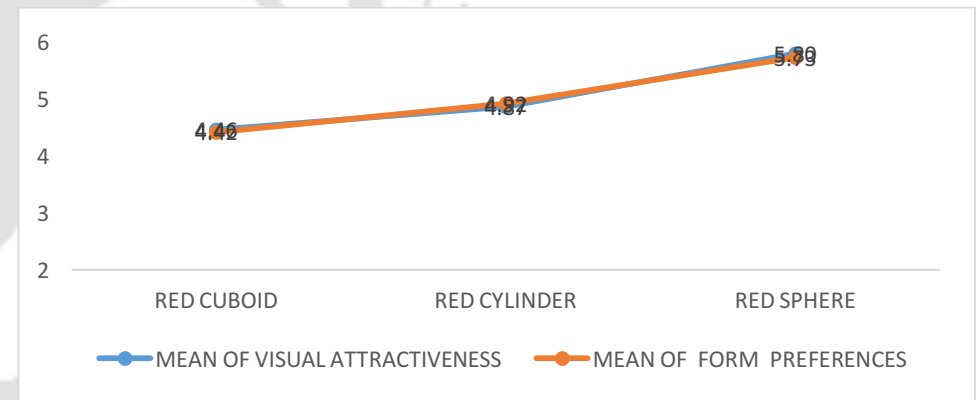


Figure 3.5 Product Category1: Combination 4: Three forms of reds

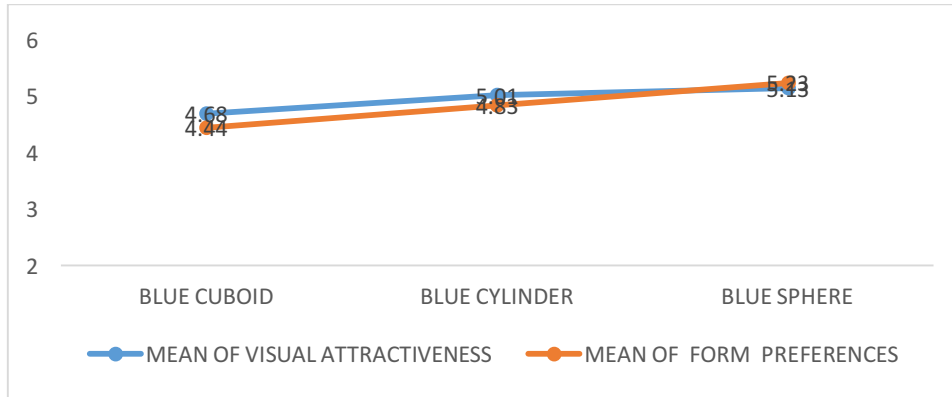


Figure 3.6 Product Category1: Combination 5: Three forms of blues

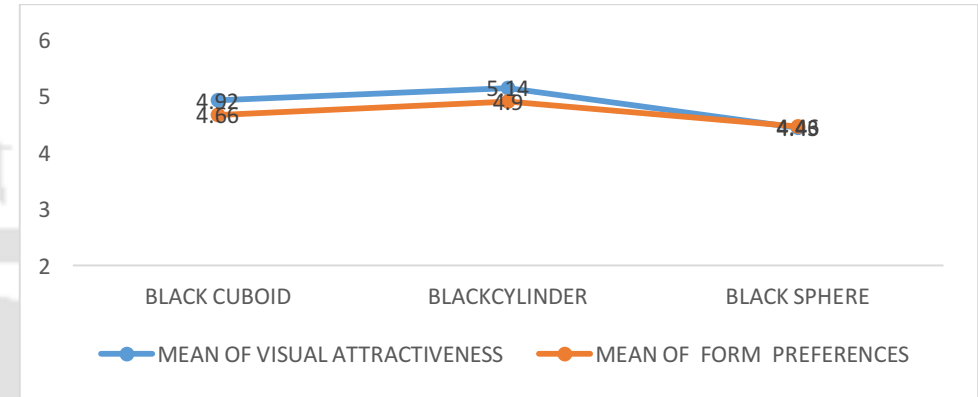


Figure 3.8 Product Category1: Combination 7: Three forms of blacks

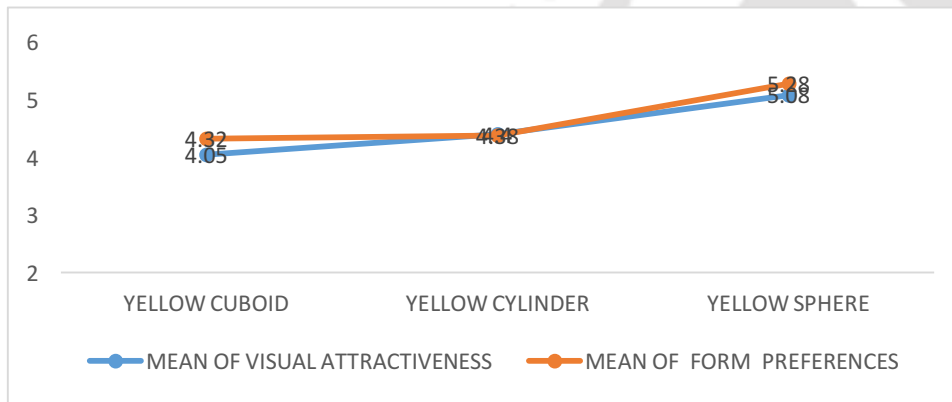


Figure 3.7 Product Category1: Combination 6: Three forms of yellows

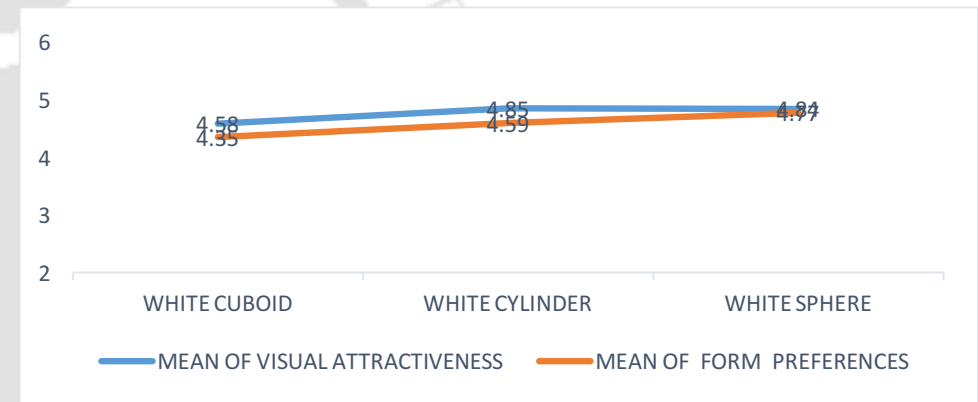


Figure 3.9 Product Category1: Combination 8: Three forms of whites

LSD (Least Significant Difference) test was conducted to observe the significant difference of visual attractiveness, colour preference and form preference among different products in product category-1. Products were numbered for convenience during the study (Table 3.1).

Table 3.1 Study-2: Product codes of products used in the study

Product Codes	Product Names
1	Red Cuboid
2	Blue Cuboid
3	Yellow Cuboid
4	Black Cuboid
5	White Cuboid
6	Red Cylinder
7	Blue Cylinder
8	Yellow Cylinder
9	Black Cylinder
10	White Cylinder
11	Red Sphere
12	Blue Sphere
13	Yellow Sphere
14	Black Sphere
15	White Sphere

It was observed that visual attractiveness, colour preference and form preference were significantly higher in case of 11(Red Sphere) in comparison to other products (shown in Table 3.3) except 9 (Black Cylinder) and 12 (Blue Sphere). Observations from Table 3.3 infer that most participants significantly preferred Red Sphere than the other products.

Table 3.2 Study-2: Significant differences for visual attractiveness, colour preference and form preference among the fifteen products in Product category-1 (Questionnaire Study)

Study-2	Variation type	df (s)	F-value	Level of significance
Visual Attractiveness	Between Groups	14	8.084	0.001
Colour Preference	Between Groups	14	6.226	0.001
Form Preference	Between Groups	14	5.615	0.001

Table 3.3 Study-2: Visual Attractiveness for product 11 ($M \pm SE$; 5.795 ± 0.1365), Colour Preference for product 11 ($M \pm SE$; 5.67 ± 0.146) and Form Preference for product 11 ($M \pm SE$; 5.79 ± 0.162) compared with other products in product category-1

Dependent variables	Product Category-1	$M \pm SE$	Level of Significance	95% Confidence Interval	
				Lower Bound	Upper Bound
Visual Attractiveness	11	1.240 $\pm$ 0.226	0.001	0.797	1.683
		0.880 $\pm$ 0.226	0.001	0.437	1.323
		1.850 $\pm$ 0.226	0.001	1.407	2.293
		0.820 $\pm$ 0.226	0.001	0.377	1.263
		1.225 $\pm$ 0.226	0.001	0.782	1.668
		0.725 $\pm$ 0.226	0.001	0.282	1.168
		0.765 $\pm$ 0.226	0.001	0.322	1.208
		1.640 $\pm$ 0.226	0.001	1.197	2.083
		0.705 $\pm$ 0.226	0.002	0.262	1.148
		1.095 $\pm$ 0.226	0.001	0.652	1.538
		0.700 $\pm$ 0.226	0.002	0.257	1.143
		0.925 $\pm$ 0.226	0.001	0.482	1.368
		1.475 $\pm$ 0.226	0.001	1.032	1.918
		1.225 $\pm$ 0.226	0.001	0.782	1.668
Colour Preference	11	1.210 $\pm$ 0.240	0.001	0.74	1.68
		0.870 $\pm$ 0.240	0.001	0.40	1.34
		1.690 $\pm$ 0.240	0.001	1.22	2.16
		0.700 $\pm$ 0.240	0.004	0.23	1.17
		0.970 $\pm$ 0.240	0.001	0.50	1.44
		0.810 $\pm$ 0.240	0.001	0.34	1.28
		0.540 $\pm$ 0.240	0.025	0.07	1.01
		1.560 $\pm$ 0.240	0.001	1.09	2.03
		0.610 $\pm$ 0.240	0.011	0.14	1.08
		0.870 $\pm$ 0.240	0.001	0.40	1.34
		0.600 $\pm$ 0.240	0.013	0.13	1.07
		1.290 $\pm$ 0.240	0.001	0.82	1.76
		1.110 $\pm$ 0.240	0.001	0.64	1.58
		0.960 $\pm$ 0.240	0.001	0.49	1.43
Form Preference	11	1.310 $\pm$ 0.244	0.001	0.83	1.79
		1.290 $\pm$ 0.244	0.001	0.81	1.77
		1.410 $\pm$ 0.244	0.001	0.93	1.89
		1.070 $\pm$ 0.244	0.001	0.59	1.55
		1.380 $\pm$ 0.244	0.001	0.90	1.86
		0.810 $\pm$ 0.244	0.001	0.33	1.29
		0.900 $\pm$ 0.244	0.001	0.42	1.38
		1.350 $\pm$ 0.244	0.001	0.87	1.83
		0.830 $\pm$ 0.244	0.001	0.35	1.31
		1.140 $\pm$ 0.244	0.001	0.66	1.62
		0.500 $\pm$ 0.244	0.040	0.02	0.98
		0.450 $\pm$ 0.244	0.065	0.03	0.93
		1.270 $\pm$ 0.244	0.001	0.79	1.75
		0.960 $\pm$ 0.244	0.001	0.48	1.44

To study if colour was more influential than form, correlation test was performed and the analysis revealed that colour is more influential than form. This was retrieved by finding out correlation values of product choice with respect to colour and product choice with respect to form (Table 3.4).

Table 3.4 Study-2: Correlation coefficients among product choice, colour preference and form preference in Product category-1 (n=1500) (Questionnaire Study)

Study-2	Product Choice	CP (Colour Preference)	FP (Form Preference)
Product Choice	1.000	.170**	.151**
CP (Colour Preference)	.170**	1.000	.381**
FP (Form Preference)	.151**	.381**	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

2 Experiment-2: Using Eye-Tracking

2.1 Aim of the experiment

Aim of the experiment is to study the visual attractiveness of the presented products, to find out which is more preferred between colour and form of products during product selection. The products presented here are products with non-recognisable function (Product category-1).

2.2 Experimental Design

2.2.1 Stimulus Preparation

Experiment involved a visual presentation of products with non-recognisable function of basic forms and primary colours similar to stimulus used in Product Category-1, Experiment-1. The products were presented in eight combinations (Figure 3.1) and after eye movement recording is complete, verbal responses regarding the product choice were recorded to retrieve the choosing intensions of the participants.

2.2.2 Participants

50 students (26 males and 24 females of age group 18-25 years) volunteered for the experiment similar to the previous experiment (Refer Experiment-1, Section 1.2.2).

2.2.3 Measures

Comfortable room temperature and ideal ambient illumination of about 24 °C (75 °F) and 500 lux respectively were maintained during the experiment (Bridger, 2003; Sanjog et al., 2013). The viewing distance to observe products presented was 1.5 meters.

2.2.4 Experimental Procedure

Participants were briefed regarding the nature of the experiment and were instructed to sit in front of the display area with the eye tracking setup (SMI iViewX-HED). Participants were informed that it is a colour and form study where fifteen products will be presented (in combinations) in eight different sets. They were informed to choose a product from each combination based on their liking and were instructed not to speak out their choices during the experiment. Participants were explained that their eye movements will be recording by an eye tracker. Participants were made comfortable with the head mount instrument during calibration. During eye movement study, participants were asked to place their chin on a chin rest as it is required to avoid head movement.

Calibration was done defining the area where stimulus was presented after mounting the head gear. Products were presented in eight combinations in the order shown in figure 3.1 and eye movements were recorded. Participants were instructed to close their eyes while combinations are changed. First three combinations were presented for 15 seconds each and combinations from four to eight were presented for 9 seconds each such that every product in a combination gets 3 seconds for viewing. After recording and saving the video data of each participant, scan path and heat map on area of interest (AOI) were evaluated using SMI Be-gaze 0.3 software. At the end of eye tracking experiment, each participant was asked to give verbal responses regarding their product choice and the responses were recorded manually.

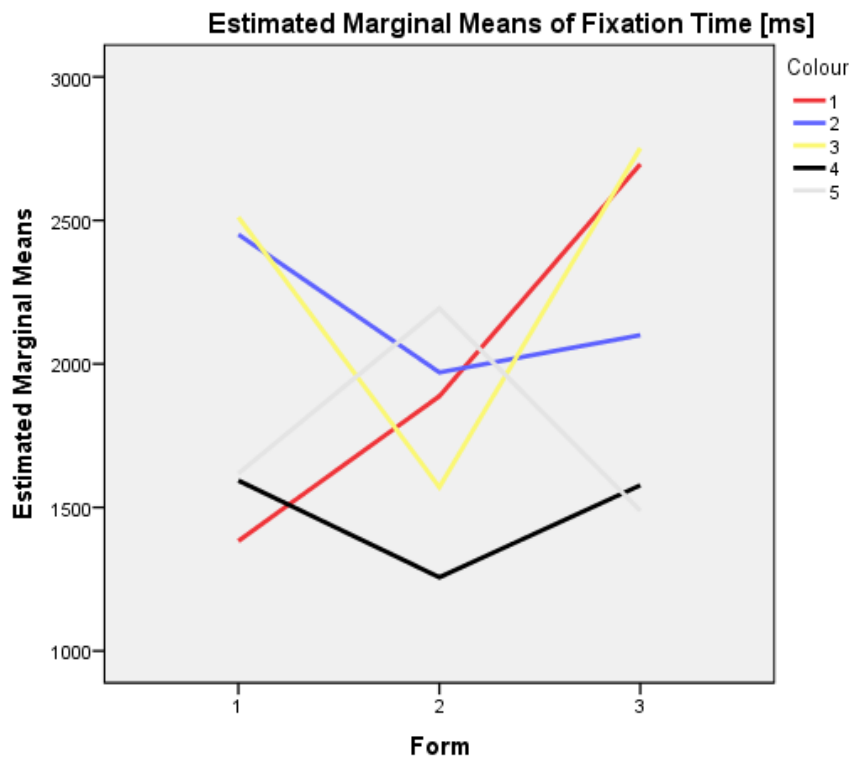
2.3 Results and Observations

One-way MANOVA was adopted to check significant variation in product choice among different products for colour preference and form preference. In MANOVA, all fifteen products were considered as independent variables and eye-tracking parameters related to visual attention (fixation counts and fixation duration)

were considered as dependent variables. It is known from the literature that visual attention is directly proportionate to the product choice, which means that if the visual attention of a participant is high on a particular product then the chances of choosing that product is always high (Creusen and Schoormans, 2005). Observation from statistical analysis (MANOVA) has been presented in Table 3.5 where $p < 0.05$ is considered as level of significance. Software used for analysis was SPSS 20. It is clear from Table 3.5 that there is significant difference in visual attention among all fifteen products regarding colour preference but there was no significant difference in case of form preference.

Table 3.5 Study-2: Significant differences for colour preference and form preference among the fifteen products in Product category-1 (Eye Tracking Study)

Study-2	Dependent Variable	Variation type	df (Hypothesis, Error)	F-value	Level of significance
Colour Preference	Fixation Count	Between Groups	4, 1484	4.451	0.001
	Fixation Time	Between Groups	4, 1484	3.525	0.007
Form Preference	Fixation Count	Between Groups	2, 1484	1.635	0.195
	Fixation Time	Between Groups	2, 1484	1.715	0.180
Colour * Form	Fixation Count	Between Groups	8, 1484	1.134	0.337
	Fixation Time	Between Groups	8, 1484	2.578	0.009



Covariates appearing in the model are evaluated at the following values: AOI Size [px] = 4110.75

Figure 3.10 Mean Fixation Time of all the products presented in Study-2 (Eye Tracking Study)

Table 3.6 Study-2: Correlation coefficients among product choice, colour preference and form preference in Product category-1 (n=750) (Eye Tracking Study)

Study-2	Product Choice	CP (Colour Preference)	FP (Form Preference)
Product Choice	1.000	.074*	.022
CP (Colour Preference)	.074*	1.000	.146**
FP (Form Preference)	.022	.146**	1.000

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Choice of colour and form of products was interpreted from fixation time which is a visual attention related eye-tracking parameter. Software used for analysis was SPSS 20. It was observed that mean fixation time was significantly higher in case of Red Sphere and Yellow Sphere in comparison to other products (shown in Figure 3.10). To study if colour was more influential than form, correlation test was performed and the analysis revealed that colour is more influential than form. This was retrieved by finding out correlation values of product choice with respect to colour and product choice with respect to form (Table 3.6).



Chapter 4

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Chapter abstract: This chapter presents an experimental study to observe the preference of colour and form in a set of products recognisable function. USB flash drives have been presented as the stimulus. Five colours (Red, blue, yellow, black and white) and three forms (cuboid, cylinder and sphere) were included in the study. Fifteen products (USB Flash drives) were presented to the participants in eight combinations. Detailed flow of the study including the objectives and experimental design have been presented. The instruments used for conducting the study were questionnaires and eye tracking technique. It was found from questionnaire study that the most preferred product was black cuboid. Even from the eye tracking study, the most preferred product was found to be black cuboid. In this study involving products with recognizable function, it was found that form is more influential than colour which contradicted the observation of previous study involving products with non-recognizable function. The results of both have been highlighted and presented through statistical data.

1 Experiment-1: Using Questionnaires

1.1 Aim of the experiment

Aim of the experiment is to study the visual attractiveness of USB flash drives presented to the participants, to find out which is more preferred between colour and form of products during product selection and to study the product purchase intension of the participants.

1.2 Experimental Design

1.2.1 Stimulus Preparation

USB Flash drives (Product category-2) were selected under the category of products with recognizable function. It was intentional to choose the products that were well-known and used by participants regularly. Functionality or the way of use was easily visible from the appearance of USB Flash drives. Moreover, functionality or use purpose were kept well informed to the participants. This was done to eliminate attention/ curiosity of participants on the affordance/ functionality aspect of the product and to focus only on the primary task of choosing the product based on its colour and/or form (not on any other attributes of products). Experiment involved a

visual presentation of USB flash drives of basic forms and primary colours. There were a set of fifteen products. Primary colours red, yellow, blue from RYB colour model (Feisner, 2006; Fraser & Banks, 2004) and black, white were used. Basic geometric forms cuboid, cylinder and sphere were chosen (figure 4.1).



Figure 4.1 A set (white) of USB flash drives in basic geometric forms

The products were presented in eight combinations (figure 4.2) and a questionnaire (Appendix-1B) for each combination (a total of eight questionnaires) was given to retrieve the choosing intensions of the participants.

Combinations	Products Presented	Combinations	Products Presented
1 cuboid		5 blue	
2 cylinders		6 yellow	
3 sphere		7 black	
4 red		8 white	

Figure 4.2 Combinations presented in product category-2 (USB flash drives)

1.2.2 Participants

50 students (26 males and 24 females of age group 18-25 years) volunteered for the experiment similar to Study-2: Product Category-1 (Refer Chapter-3, Experiment-1, Section 1.2.2).

1.2.3 Measures

Measures taken were same as Study-2: Product Category-1 (Refer Chapter-3, Section-1.2.3).

1.2.4 Experimental Procedure

Participants were initially instructed about the experiment that it is a colour and form study where fifteen products will be presented in combinations in eight different sets. They were informed that there will be a questionnaire for each set, where they will have to rate the products based on their liking of colour, form and attractiveness towards each of the product. Each combination of products was displayed in the order shown in figure 4.2. Each combination was followed by a questionnaire where they were asked about visually appealing products, product selection due to colour and product selection due to form.

1.3 Results and Observations

Average values of visual attractiveness, colour preference and form preference for fifteen combinations of products are graphically represented in Figures 4.3-4.10. It was observed that visual attractiveness of products and their colour preference/ form preference were almost similar in maximum cases. There were observable differences in the mean values of visual attractiveness, colour preference and form preference of all the fifteen products. One-way ANOVA was adopted to check significant variation among different products for visual attractiveness, colour preference and form preference. In ANOVA, all fifteen products were considered as independent variables and visual attractiveness, colour preference and form preference were considered as dependent variables.

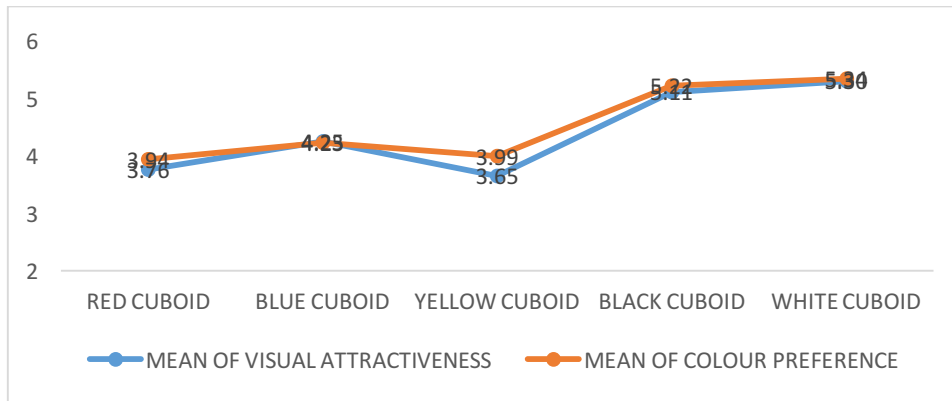


Figure 4.3 Product Category2: Combination1: Five colours of cuboids

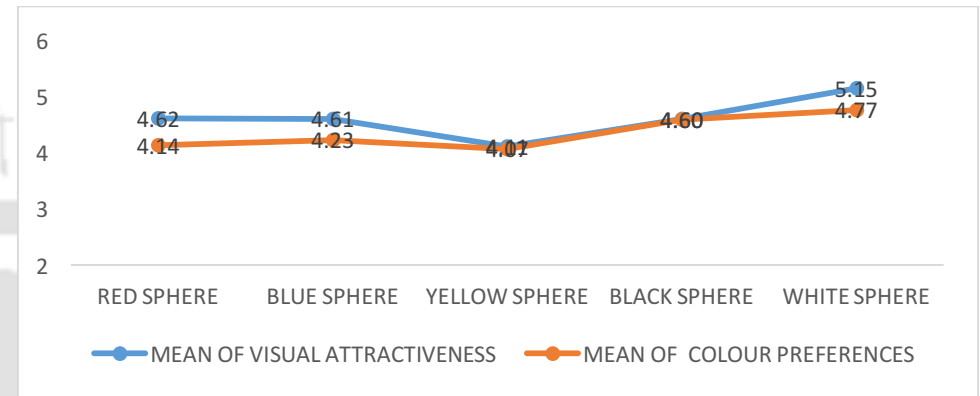


Figure 4.5 Product Category2: Combination 3: Five colours of spheres

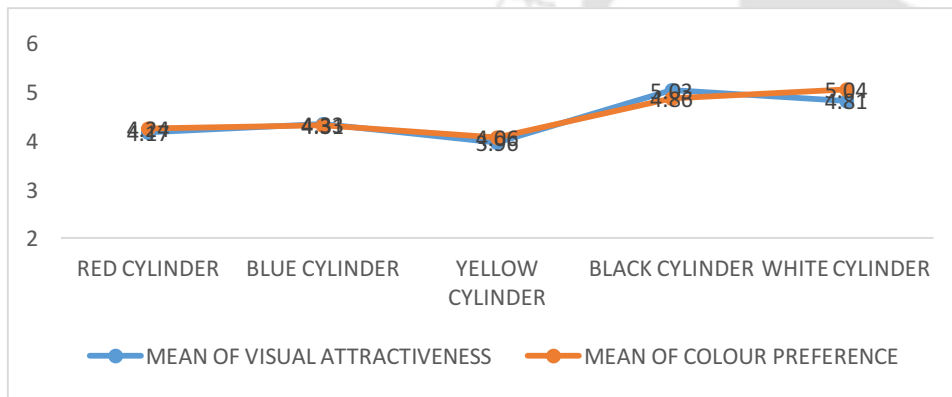


Figure 4.4 Product Category2: Combination 2: Five colours of cylinders

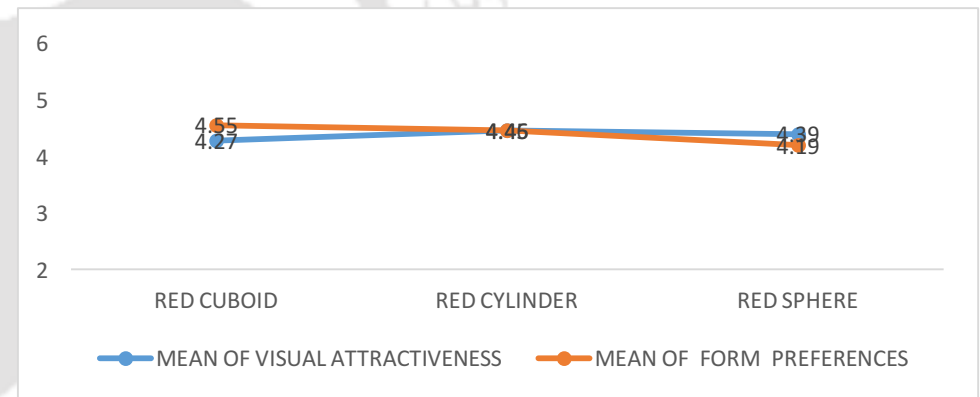


Figure 4.6 Product Category2: Combination 4: Three forms of reds

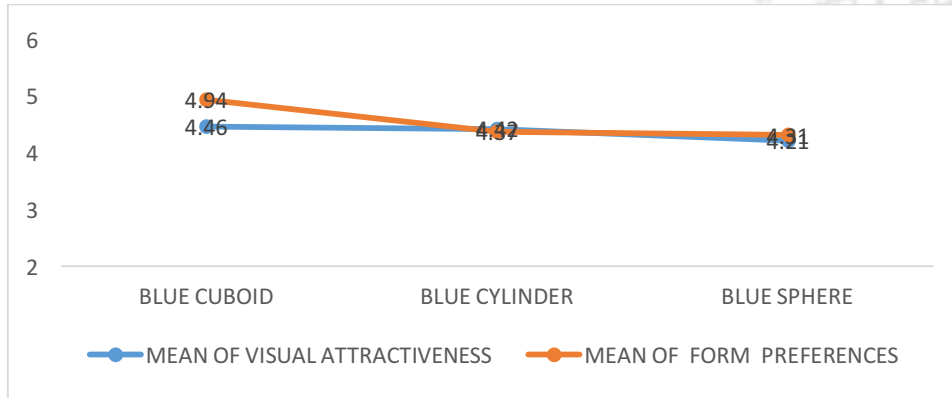


Figure 4.7 Product Category2: Combination 5: Three forms of blues

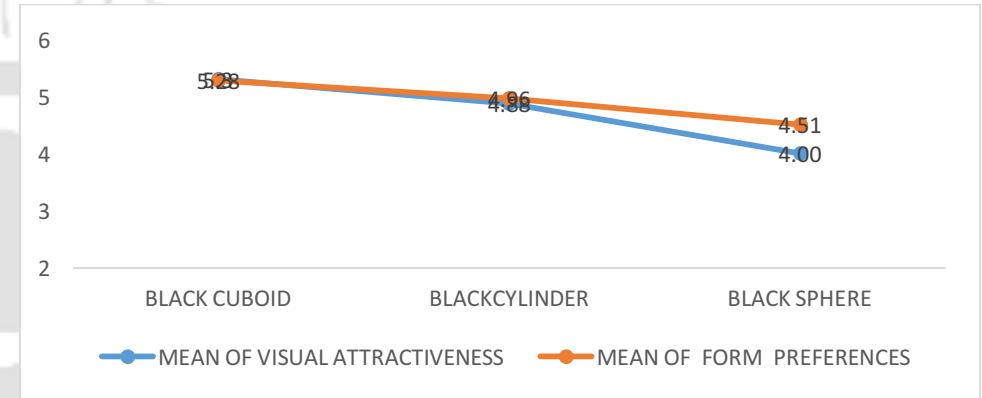


Figure 4.9 Product Category2: Combination 7: Three forms of blacks

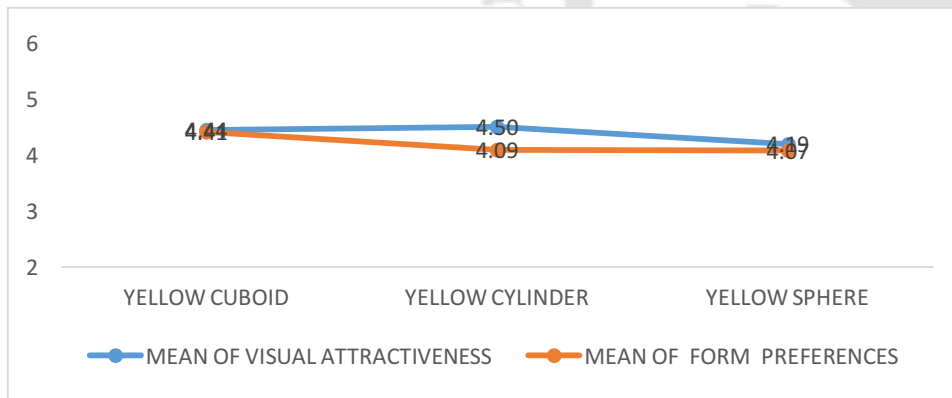


Figure 4.8 Product Category2: Combination 6: Three forms of yellows

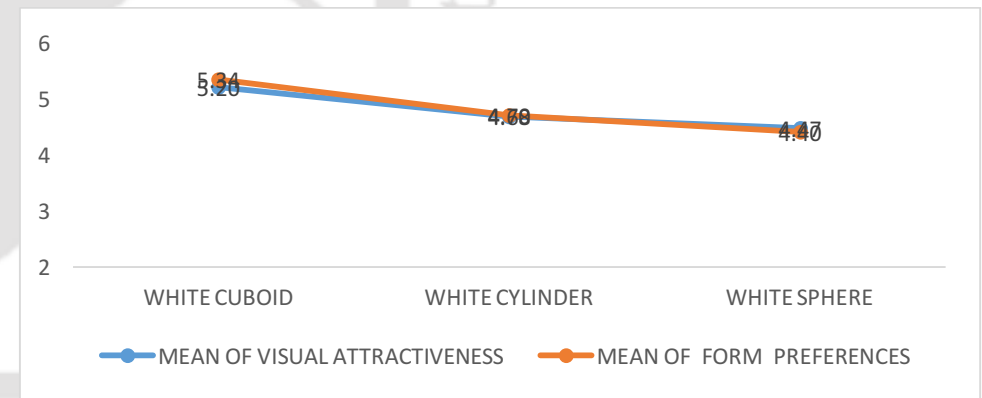


Figure 4.10 Product Category2: Combination 8: Three forms of whites

Observation from statistical analysis (ANOVA) has been presented in Table 4.1 where $p < 0.001$ is considered as level of significance. Software used for analysis was SPSS 20. It is clear from Table 4.1 that there is significant difference among all fifteen products regarding visual attractiveness, colour preference and form preference.

LSD (Least Significant Difference) test was conducted to observe the significant difference of visual attractiveness, colour preference and form preference among different products in product category-2. Products were numbered for convenience during the study (Table 3.1).

It was observed that visual attractiveness, colour preference and form preference were significantly higher in case of 4 (Black Cuboid) in comparison to other products (shown in Table 4.2) in most cases but not all. Observations from Table 4.2 infer that most participants significantly preferred Black Cuboid than the other products.

Table 4.1 Study-3: Significant differences for visual attractiveness, colour preference and form preference among the fifteen products in Product category-2 (Questionnaire Study)

Study-3	Variation type	df (s)	F-value	Level of significance
Visual Attractiveness	Between Groups	14	5.043	0.001
Colour Preference	Between Groups	14	6.870	0.001
Form Preference	Between Groups	14	4.727	0.001

Table 4.2 Study-3: Visual Attractiveness for product 4 ($M \pm SE$; 5.795 $\pm$ 0.1365), Colour Preference for product 4 ($M \pm SE$; 5.67 $\pm$ 0.146) and Form Preference for product 4 ($M \pm SE$; 5.79 $\pm$ 0.162) compared with other products in product category-2

Dependent variables	Product Category-1	M $\pm$ SE	Level of Significance	95% Confidence Interval	
				Lower Bound	Upper Bound
Visual Attractiveness	4	1 1.190 $\pm$ 0.248	0.001	0.703	1.677
		2 0.850 $\pm$ 0.248	0.001	0.363	1.337
		3 1.160 $\pm$ 0.248	0.001	0.673	1.647
		5 -0.045 $\pm$ 0.248	0.856	-0.532	0.442
		6 0.890 $\pm$ 0.248	0.001	0.403	1.377
		7 0.830 $\pm$ 0.248	0.001	0.343	1.317
		8 0.975 $\pm$ 0.248	0.001	0.488	1.462
		9 0.250 $\pm$ 0.248	0.314	-0.237	0.737
		10 0.460 $\pm$ 0.248	0.064	-0.027	0.947
		11 0.700 $\pm$ 0.248	0.005	0.213	1.187
		12 0.795 $\pm$ 0.248	0.001	0.308	1.282
		13 1.055 $\pm$ 0.248	0.001	0.568	1.542
		14 0.905 $\pm$ 0.248	0.001	0.418	1.392
		15 0.395 $\pm$ 0.248	0.112	-0.092	0.882
Colour Preference	4	1 1.280 $\pm$ 0.252	0.001	0.79	1.77
		2 0.990 $\pm$ 0.252	0.001	0.50	1.48
		3 1.230 $\pm$ 0.252	0.001	0.74	1.72
		5 -0.120 $\pm$ 0.252	0.633	-0.61	0.37
		6 0.980 $\pm$ 0.252	0.001	0.49	1.47
		7 0.910 $\pm$ 0.252	0.001	0.42	1.40
		8 1.160 $\pm$ 0.252	0.001	0.67	1.65
		9 0.360 $\pm$ 0.252	0.153	-0.13	0.85
		10 0.180 $\pm$ 0.252	0.474	-0.31	0.67
		11 1.080 $\pm$ 0.252	0.001	0.59	1.57
		12 0.990 $\pm$ 0.252	0.001	0.50	1.48
		13 1.150 $\pm$ 0.252	0.001	0.66	1.64
		14 0.624 $\pm$ 0.252	0.013	0.13	1.12
		15 0.450 $\pm$ 0.252	0.074	-0.04	0.94
Form Preference	4	1 0.730 $\pm$ 0.258	0.005	0.22	1.24
		2 0.340 $\pm$ 0.258	0.188	-0.17	0.85
		3 0.870 $\pm$ 0.258	0.001	0.36	1.38
		5 -0.060 $\pm$ 0.258	0.816	-0.57	0.45
		6 0.830 $\pm$ 0.258	0.001	0.32	1.34
		7 0.910 $\pm$ 0.258	0.001	0.40	1.42
		8 1.190 $\pm$ 0.258	0.001	0.68	1.70
		9 0.320 $\pm$ 0.258	0.216	-0.19	0.83
		10 0.580 $\pm$ 0.258	0.025	0.07	1.09
		11 1.090 $\pm$ 0.258	0.001	0.58	1.60
		12 0.970 $\pm$ 0.258	0.001	0.46	1.48
		13 1.210 $\pm$ 0.258	0.001	0.70	1.72
		14 0.770 $\pm$ 0.258	0.003	0.26	1.28
		15 0.880 $\pm$ 0.258	0.001	0.37	1.39

To study if colour was more influential than form, correlation test was performed and the analysis revealed that form is more influential than colour. This was retrieved by finding out correlation values of product choice with respect to colour and product choice with respect to form (Table 4.3).

Table 4.3 Study-3: Correlation coefficients among product choice, colour preference and form preference in Product category-2 (n=1500) (Questionnaire Study)

Study-3	Product Choice	CP (Colour Preference)	FP (Form Preference)
Product Choice	1.000	.148**	.173**
CP (Colour Preference)	.148**	1.000	.601**
FP (Form Preference)	.173**	.601**	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

2 Experiment-2: Using Eye-Tracking

2.1 Aim of the experiment

Aim of the experiment is to study the visual attractiveness of USB flash drives presented to the participants, to find out which is more preferred between colour and form of products during product selection and to study the product purchase intension of the participants.

2.2 Experimental Design

2.2.1 Stimulus Preparation

Experiment involved a visual presentation of USB flash drives of basic forms and primary colours similar to stimulus used in Product Category-2, Experiment-1. The products were presented in eight combinations (figure 4.2) and after eye movement recording is complete, verbal responses regarding the product choice were recorded to retrieve the choosing intensions of the participants.

2.2.2 Participants

50 students (26 males and 24 females of age group 18-25 years) volunteered for the experiment similar to Study-2: Product Category-1 (Refer Chapter-3, Experiment-1, Section 1.2.2).

2.2.3 Measures

Experimental measures are similar to measures taken in Study-2: Product Category-1 (Refer Experiment-2, Section 2.2.3).

2.2.4 Experimental Procedure

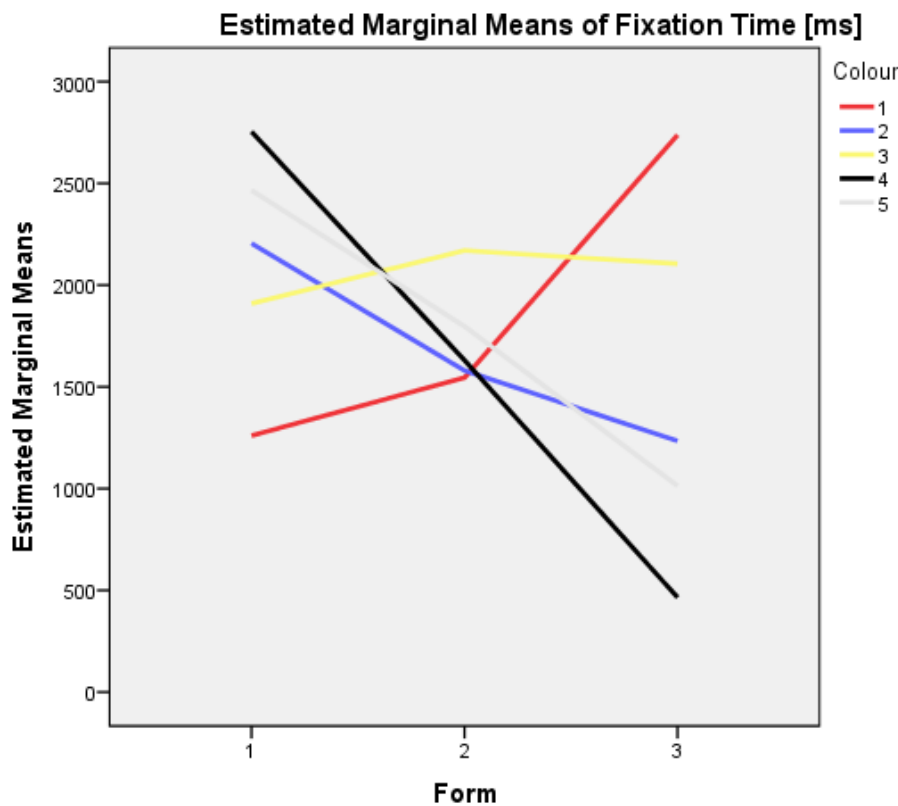
Participants were briefed regarding the nature of the experiment and was instructed to sit in front of the display area with the eye tracking setup (SMI iViewX-HED). Calibration was done defining the area where stimulus was presented after mounting the head gear. Products were presented in eight combinations in the order shown in figure 4.2 and eye movements were recorded. Participants were instructed to close their eyes while combinations are changed. First three combinations were presented for 15 seconds each and combinations from four to eight were presented for 9 seconds each such that every product in a combination gets 3 seconds for viewing. After recording and saving the video data of each participant, scan path and heat map on area of interest (AOI) were evaluated using SMI Be-gaze 0.3 software. At the end of eye tracking experiment, each participant was asked to give verbal responses regarding their product choice and the responses were recorded manually.

2.3 Results and Observations

One-way MANOVA was adopted to check significant variation in product choice among different products for colour preference and form preference. In MANOVA, all fifteen products were considered as independent variables and eye-tracking parameters related to visual attention (fixation counts and fixation duration) were considered as dependent variables. Wells et al. (2011) mentioned that visual appeal due to attractive look positively influences product purchase intention. Product choice depends on pleasure, which is a positive emotional factor that can be perceived through product appearance (Demirbilek and Sener, 2003; Hartono and Chuan, 2011; Jordan, 1998). For the current research, an assumption was made that more visual attention is indicative of product choice. This assumption was found correct/ true following correlation analysis among product choice, colour preference and form preference. Here, preference towards colour and form was represented in terms of fixation duration. In the present research, fixation duration on specific product during colour preference or during form preference were significantly correlated with product choice (table 4.5). Thus, in the current research product choice was found significantly

correlated with visual attention (in terms of fixation time). Thus, it can be argued that participants made choice for the product which captured more visual attention and this higher visual attention might be due to their preference for the particular colour or form. Observation from statistical analysis (MANOVA) has been presented in Table 4.4 where $p < 0.05$ is considered as level of significance. Software used for analysis was SPSS 20. It is clear from Table 4.4 that there is significant difference in visual attention among all fifteen products regarding form preference but there was no significant difference in case of colour preference.

Figure 4.11 Mean Fixation Time of all the products presented in Study-3 (Eye Tracking Study)



Covariates appearing in the model are evaluated at the following values: AOI Size [px] = 3135.08

Table 4.4 Study-3: Significant differences for colour preference and form preference among the fifteen products in Product category-2 (Eye Tracking Study)

Study-3	Dependent Variable	Variation type	df (Hypothesis, Error)	F-value	Level of significance
Colour Preference	Fixation Count	Between Groups	4, 1484	1.939	0.100
	Fixation Time	Between Groups	4, 1484	0.840	0.500
Form Preference	Fixation Count	Between Groups	2, 1484	1.868	0.160
	Fixation Time	Between Groups	2, 1484	3.711	0.020
Colour * Form	Fixation Count	Between Groups	8, 1484	3.153	0.002
	Fixation Time	Between Groups	8, 1484	4.275	0.001

It was observed that mean fixation time was significantly higher in case of Black cuboid in comparison to other products (shown in Figure 4.11). In the previous study where non-recognisable products were presented as stimulus, sphere was most preferred but here when USB flash drives were presented cuboid was most preferred. The intention of not selecting the spherical shaped USB Flash drive might be due to its form which is uncommon or unfamiliar form for an USB Flash drive to the participant under study.

To study if colour was more influential than form, correlation test was performed and the analysis revealed that form is more influential than colour.

Table 4.5 Study-3: Correlation coefficients among product choice, colour preference and form preference in Product category-2 (n=750) (Eye Tracking Study)

Study-3	Product Choice	CP (Colour Preference)	FP (Form Preference)
Product Choice	1.000	.045	.216**
CP (Colour Preference)	.045	1.000	.346**
FP (Form Preference)	.216**	.346**	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

This was retrieved by finding out correlation values of product choice with respect to colour and product choice with respect to form (Table 4.5). Choice of colour and form of products was interpreted from fixation time which is a visual attention related eye-tracking parameter. Software used for analysis was SPSS 20.



Chapter 5

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Chapter abstract: This chapter presents an experimental study to observe the preference of colour and form in a set of products recognisable function. Tea cups have been presented as the stimulus. Five colours (Red, blue, yellow, black and white) and three forms (cuboid, cylinder and sphere) were included in the study. Fifteen products (Tea Cups) were presented to the participants in eight combinations. Stimulus was presented both virtually (image on computer screen) as well as in the physical mode to study the variation in the preference due to difference in mode of presentation. Detailed flow of the study including the objectives and experimental design have been presented. The instruments used for conducting the study were questionnaires and eye tracking technique. The statistical analysis of results from Questionnaire study revealed that the most preferred product was black sphere and white sphere. In the Eye tracking study, when stimulus was presented in physical mode, the most preferred product was found to be black sphere and when stimulus was presented in virtual mode, blue cuboid was found to be most preferred product. From both questionnaire study and an eye-Tracking study, it was found that colour is more influential than form.

1 Experiment-1: Using Questionnaires

1.1 Aim of the experiment

Aim of the experiment is to study the visual attractiveness of Tea cups presented to the participants, to find out most preference between colour and form of products during product selection and to study the product purchase intension of the participants.

1.2 Experimental Design

1.2.1 Stimulus Preparation

Experiment involved a visual presentation of Tea cups of basic forms and primary colours. There were a set of fifteen products. Primary colours red, yellow, blue from RYB colour model (Feisner, 2006; Fraser & Banks, 2004) and black, white were used. Basic geometric forms cuboid, cylinder and sphere were chosen. Tea cups (also USB Flash drives in earlier study) are very commonly used products by most of the participants (students) of the current research. These tea cups were selected against the USB Flash drives (used in earlier experiments) as to provide the products (visual stimuli) completely different functionality or use contexts. Moreover, as the

participants were well acquainted with the use of tea cups, there was no need to guess/ identify the function/ way of using the product used for the experiment. Functionality or affordance were well understood or visible to the participants. This was done to eliminate attention/ curiosity of participants on the affordance/ functionality aspect of the product and to focus only on the primary task of choosing the product based on its colour and/or form (not on any other attributes of products). The products were presented in eight combinations (figure 5.1) and a questionnaire (Appendix-1C) to for each combination (a total of eight questionnaires) was given to retrieve the choosing intensions of the participants.

Combinations	Products Presented	Combinations	Products Presented
1 cuboid		5 blue	
2 cylinders		6 yellow	
3 sphere		7 black	
4 red		8 white	

Figure 5.1 Combinations presented in product category-3 (Tea cups)

1.2.2 Participants

50 students (26 males and 24 females of age group 18-25 years) volunteered for the experiment similar to Study-2: Product Category-1 (Refer Chapter-3, Experiment-1, Section 1.2.2).

1.2.3 Measures

Measures taken were same as Study-2: Product Category-1 (Refer Chapter-3, Section-1.2.3).

1.2.4 Experimental Procedure

Participants were initially instructed briefly about the experiment and each combination of products was displayed in the order shown in figure 5.1. Each combination is followed by a questionnaire where they are asked about visually appealing products, product selection due to colour, product selection due to form.

1.3 Results and Observations

Average values of visual attractiveness, colour preference and form preference for fifteen combinations of products are graphically represented in Figures 5.2-5.9. It was observed that visual attractiveness of products and their colour preference/ form preference were almost similar in maximum cases.

There were observable differences in the mean values of visual attractiveness, colour preference and form preference of all the fifteen products. One-way ANOVA was adopted to check significant variation among different products for visual attractiveness, colour preference and form preference. In ANOVA, all fifteen products were considered as independent variables and visual attractiveness, colour preference and form preference were considered as dependent variables. Observation from statistical analysis (ANOVA) has been presented in Table 5.1 where $p < 0.001$ is considered as level of significance. Software used for analysis was SPSS 20. It is clear from Table 5.1 that there is significant difference among all fifteen products regarding visual attractiveness and colour preference but not in case of form preference.



Figure 5.2 Product Category3: Combination1: Five colours of cuboids

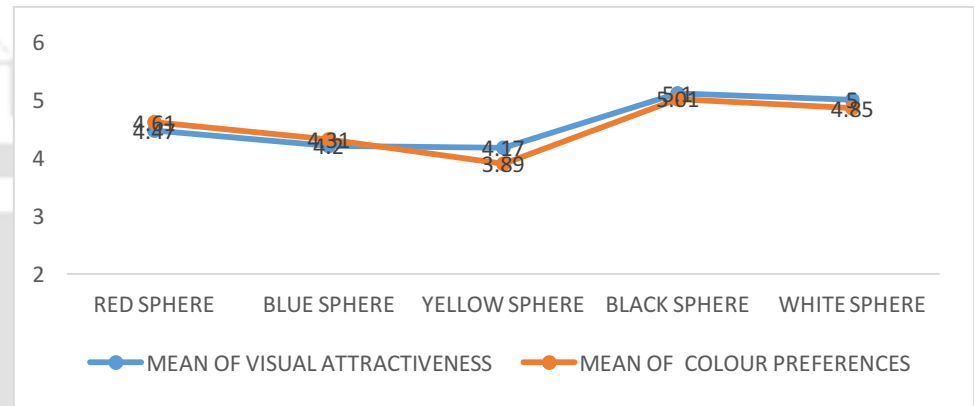


Figure 5.4 Product Category3: Combination 3: Five colours of spheres



Figure 5.3 Product Category3: Combination 2: Five colours of cylinders

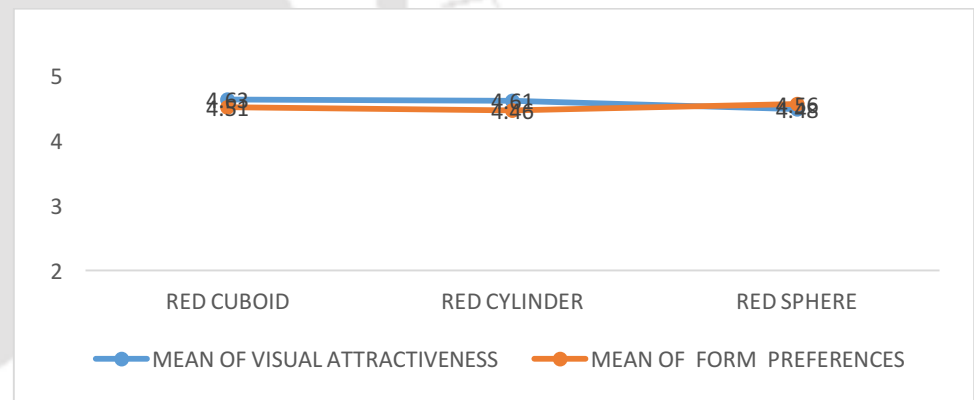


Figure 5.5 Product Category3: Combination 4: Three forms of reds

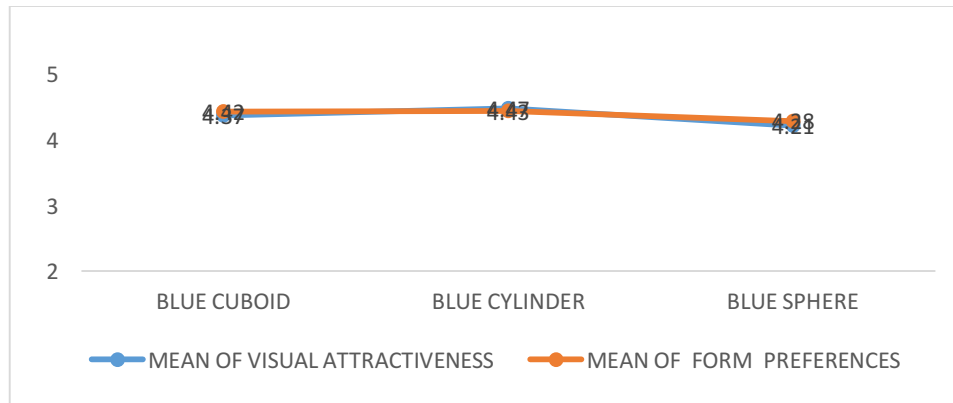


Figure 5.6 Product Category3: Combination 5: Three forms of blues

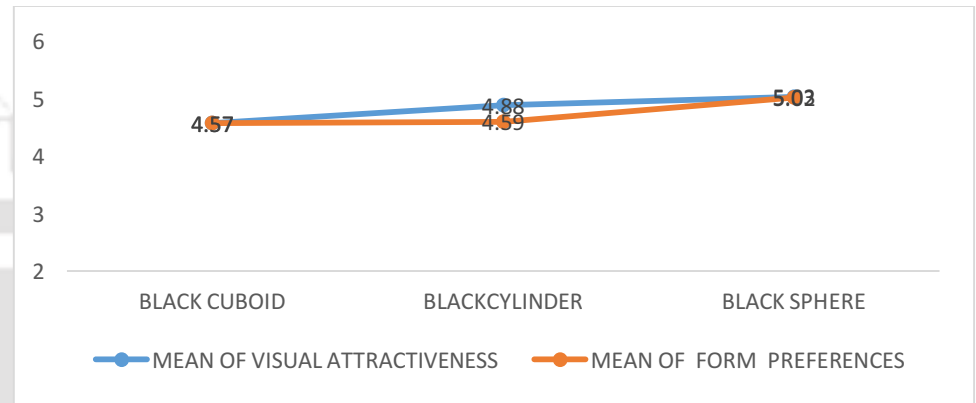


Figure 5.8 Product Category3: Combination 7: Three forms of blacks

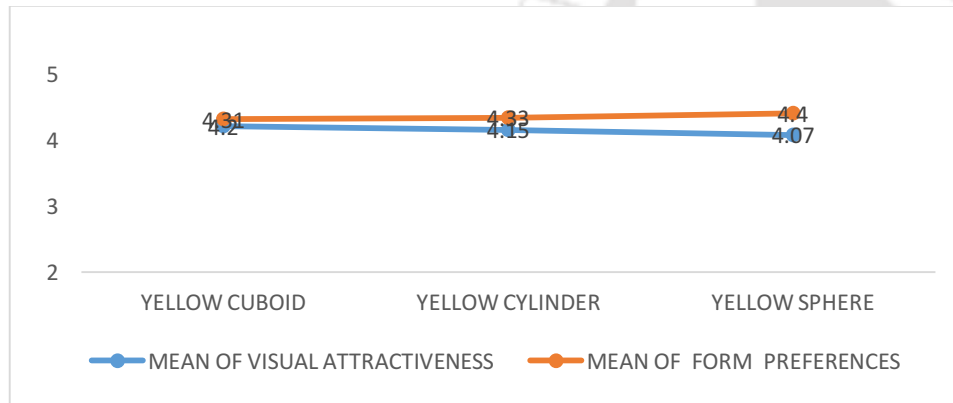


Figure 5.7 Product Category3: Combination 6: Three forms of yellows

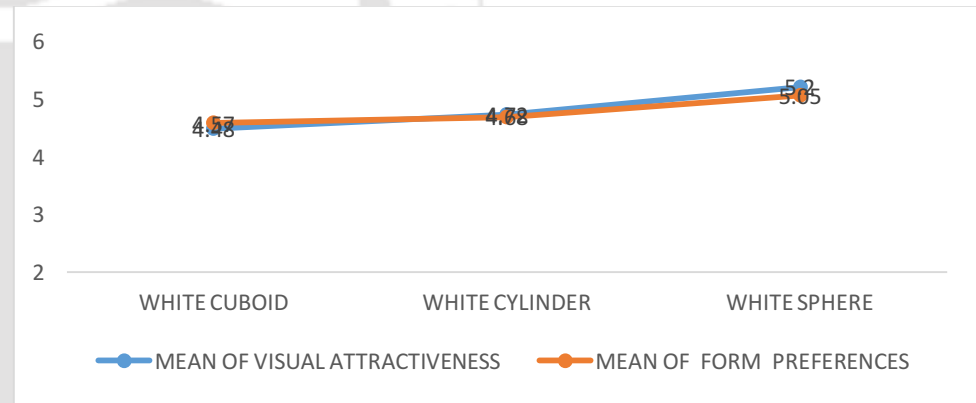


Figure 5.9 Product Category3: Combination 8: Three forms of whites

LSD (Least Significant Difference) test was conducted to observe the significant difference of visual attractiveness, colour preference and form preference among different products in product category-3. Products were numbered for convenience during the study (Table 3.1).

It was observed that visual attractiveness, colour preference and form preference were significantly higher in case of 15 (White Sphere) in comparison to other products (shown in Table 5.2) in many cases but not all. Observations from Table 5.2 infer that most participants significantly preferred White Sphere than the other products.

Table 5.1 Study-4: Significant differences for visual attractiveness, colour preference and form preference among the fifteen products in Product category-3 (Questionnaire Study)

Study-4	Variation type	df (s)	F-value	Level of significance
Visual Attractiveness	Between Groups	14	4.163	0.001
Colour Preference	Between Groups	14	4.657	0.001
Form Preference	Between Groups	14	1.685	0.053

F-value is the ratio of ‘between group variation’ and ‘within group variation’ of means (fixation count or fixation time). F-values along with degrees of freedom, helps to determine the probability of acceptance of null hypothesis. In other words, based on F value and degree of freedom, calculation of significance of variations between groups is determined. Thus, following calculation of F-value, hypothesis could be retained or rejected.

Table 5.2 Study-4: Visual Attractiveness for product 15 ($M \pm SE$; 5.795 ± 0.1365), Colour Preference for product 15 ($M \pm SE$; 5.67 ± 0.146) and Form Preference for product 15 ($M \pm SE$; 5.79 ± 0.162) compared with other products in product category-3

Dependent variables	Product Category-1	$M \pm SE$	Level of Significance	95% Confidence Interval	
				Lower Bound	Upper Bound
Visual Attractiveness	15	1 0.410 $\pm$ 0.253	0.106	-0.087	0.907
		2 0.905 $\pm$ 0.253	0.001	0.408	1.402
		3 1.055 $\pm$ 0.253	0.001	0.558	1.552
		4 0.500 $\pm$ 0.253	0.049	0.003	0.997
		5 0.645 $\pm$ 0.253	0.011	0.148	1.142
		6 0.500 $\pm$ 0.253	0.049	0.003	0.997
		7 0.895 $\pm$ 0.253	0.001	0.398	1.392
		8 1.075 $\pm$ 0.253	0.001	0.578	1.572
		9 0.105 $\pm$ 0.253	0.679	-0.392	0.602
		10 0.395 $\pm$ 0.253	0.119	-0.102	0.892
		11 0.625 $\pm$ 0.253	0.014	0.128	1.122
		12 0.895 $\pm$ 0.253	0.001	0.398	1.392
		13 0.980 $\pm$ 0.253	0.001	0.483	1.477
		14 0.035 $\pm$ 0.253	0.890	-0.462	0.532
Colour Preference	15	1 0.260 $\pm$ 0.266	0.329	-0.26	0.78
		2 0.590 $\pm$ 0.266	0.027	0.07	1.11
		3 1.110 $\pm$ 0.266	0.001	0.59	1.63
		4 0.143 $\pm$ 0.266	0.592	-0.38	0.67
		5 -0.040 $\pm$ 0.266	0.881	-0.56	0.48
		6 0.220 $\pm$ 0.266	0.409	-0.30	0.74
		7 0.510 $\pm$ 0.266	0.056	-0.01	1.03
		8 1.000 $\pm$ 0.266	0.001	0.48	1.52
		9 -0.010 $\pm$ 0.266	0.970	-0.53	0.51
		10 0.070 $\pm$ 0.266	0.793	-0.45	0.59
		11 0.240 $\pm$ 0.266	0.368	-0.28	0.76
		12 0.540 $\pm$ 0.266	0.043	0.02	1.06
		13 0.960 $\pm$ 0.266	0.001	0.44	1.48
		14 -0.160 $\pm$ 0.266	0.548	-0.68	0.36
Form Preference	15	1 0.540 $\pm$ 0.249	0.030	0.05	1.03
		2 0.630 $\pm$ 0.249	0.012	0.14	1.12
		3 0.740 $\pm$ 0.249	0.003	0.25	1.23
		4 0.480 $\pm$ 0.249	0.054	-0.01	0.97
		5 0.480 $\pm$ 0.249	0.054	-0.01	0.97
		6 0.590 $\pm$ 0.249	0.018	0.10	1.08
		7 0.620 $\pm$ 0.249	0.013	0.13	1.11
		8 0.720 $\pm$ 0.249	0.004	0.23	1.21
		9 0.460 $\pm$ 0.249	0.065	-0.03	0.95
		10 0.370 $\pm$ 0.249	0.138	-0.12	0.86
		11 0.490 $\pm$ 0.249	0.049	0.00	0.98
		12 0.770 $\pm$ 0.249	0.002	0.28	1.26
		13 0.650 $\pm$ 0.249	0.009	0.16	1.14
		14 0.030 $\pm$ 0.249	0.904	-0.46	0.52

To study if colour was more influential than form, correlation test was performed and the analysis revealed that colour is more influential than form. This was retrieved by finding out correlation values of product choice with respect to colour and product choice with respect to form (Table 5.3). Choice of colour and form of products was interpreted from fixation time which is a visual attention related eye-tracking parameter. Software used for analysis was SPSS 20.

Table 5.3 Study-4: Correlation coefficients among product choice, colour preference and form preference in Product category-3 (n=1500) (Questionnaire Study)

Study-4	Product Choice	CP (Colour Preference)	FP (Form Preference)
Product Choice	1.000	.184**	.105**
CP (Colour Preference)	.184**	1.000	.576**
FP (Form Preference)	.105**	.576**	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

2 Experiment-2: Using Eye-Tracking with stimulus presented in physical mode

2.1 Aim of the experiment

Aim of the experiment is to study the visual attractiveness of Tea cups presented to the participants, to find out most preference between colour and form of products during product selection and to study the product purchase intension of the participants.

2.2 Experimental Design

2.2.1 Stimulus Preparation

Experiment involved a visual presentation of Tea cups of basic forms and primary colours similar to stimulus used in Product Category-3, Experiment-1. The products were presented in eight combinations (figure 5.1) and after eye movement recording is complete, verbal responses regarding the product choice were recorded to retrieve the choosing intensions of the participants.

2.2.2 Participants

50 students (26 males and 24 females of age group 18-25 years) volunteered for the experiment similar to Study-2: Product Category-1 (Refer Chapter-3, Experiment-1, Section 1.2.2).

2.2.3 Measures

Experimental measures are similar to measures taken in Study-2: Product Category-1 (Refer Experiment-2, Section 2.2.3).

2.2.4 Experimental Procedure

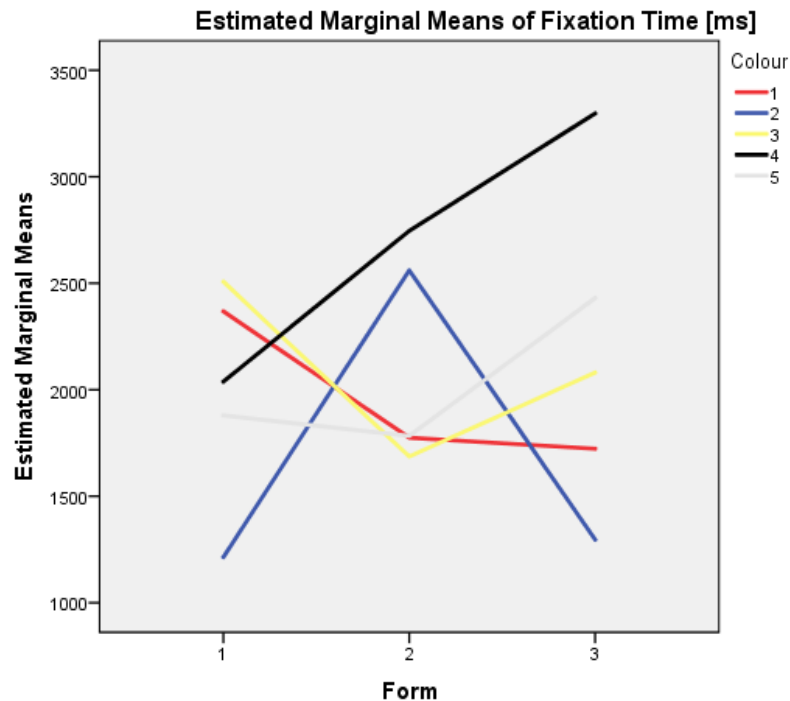
Experimental procedure was similar to the procedure followed in Study-2: Product Category-1 (Refer Experiment-2, Section 2.2.4).

2.3 Results and Observations

One-way MANOVA was adopted to check significant variation in product choice among different products for colour preference and form preference. In MANOVA, all fifteen products were considered as independent variables and eye-tracking parameters related to visual attention (fixation counts and fixation duration) were considered as dependent variables. It is known from the literature that visual attention is directly proportionate to the product choice, which means that if the visual attention of a participant is high on a particular product then the chances of choosing that product is always high. Observation from statistical analysis (MANOVA) has been presented in Table 5.4 where $p < 0.05$ is considered as level of significance. Software used for analysis was SPSS 20. It is clear from Table 5.4 that there is significant difference in visual attention among all fifteen products regarding colour preference but there was no significant difference in case of form preference.

Table 5.4 Study-4: Significant differences for colour preference and form preference among the fifteen products in Product category-3 (Eye Tracking Study, Stimulus: Physical Mode)

Study-4	Dependent Variable	Variation type	df (Hypothesis, Error)	F-value	Level of significance
Colour Preference	Fixation Count	Between Groups	4, 1484	3.470	0.008
	Fixation Time	Between Groups	4, 1484	4.242	0.002
Form Preference	Fixation Count	Between Groups	2, 1484	3.273	0.038
	Fixation Time	Between Groups	2, 1484	0.362	0.696
Colour * Form	Fixation Count	Between Groups	8, 1484	2.672	0.006
	Fixation Time	Between Groups	8, 1484	3.502	0.001



Covariates appearing in the model are evaluated at the following values: AOI Size [px] = 9952.21

Figure 5.10 Mean Fixation Time of all the products presented (physical mode) in Study-4 during eye tracking study

It was observed that mean fixation time was significantly higher in case of Black Sphere in comparison to other products (shown in Figure 5.10). To study if colour was more influential than form, correlation test was performed and the analysis revealed that colour is more influential than form. This was retrieved by finding out correlation values of product choice with respect to colour and product choice with respect to form (Table 5.5). Choice of colour and form of products was interpreted from fixation time which is a visual attention related eye-tracking parameter. Software used for analysis was SPSS 20.

Table 5.5 Study-4: Correlation coefficients among product choice, colour preference and form preference in Product category-3 when presented in physical mode (n=750) (Eye Tracking Study)

Study-4	Product Choice	CP (Colour Preference)	FP (Form Preference)
Product Choice	1.000	.147**	.104**
CP (Colour Preference)	.147**	1.000	.408**
FP (Form Preference)	.104**	.408**	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

3 Experiment-2: Using Eye-Tracking with stimulus presented in virtual mode

3.1 Aim of the experiment

Aim of the experiment is to study the visual attractiveness of Tea cups presented to the participants, to find out most preference between colour and form of products during product selection and to study the product purchase intension of the participants.

3.2 Experimental Design

3.2.1 Stimulus Preparation

Experiment involved a visual presentation of Tea cups of basic forms and primary colours. There were a set of fifteen products. Primary colours red, yellow, blue from RYB colour model (Feisner, 2006; Fraser and Banks, 2004) and black, white were used. Basic geometric forms cuboid, cylinder and sphere were chosen. The products were presented on-screen in eight combinations (figure 5.1) and after eye movement recording is complete, verbal responses regarding the product choice were recorded to retrieve the choosing intensions of the participants. The computer screen used for experiment was of LG TFT monitor with resolution of 1600 by 900 pixels and screen size 17 inches diagonally. Viewing distance was maintained at one meter (Jaschinski-Kruza, 1991).

3.2.2 Participants

50 students (26 males and 24 females of age group 18-25 years) volunteered for the experiment similar to the previous experiment (Refer Experiment-1, Section 1.2.2).

3.2.3 Measures

Experimental measures are similar to measures taken in Study-2: Product Category-1 (Refer Experiment-2, Section 2.2.3).

3.2.4 Experimental Procedure

Participants were briefed regarding the nature of the experiment and was instructed to sit in front of the display area with the eye tracking setup (SMI iViewX-HED). Calibration was done defining the area where stimulus was presented after mounting the head gear. Products were presented in eight combinations in the order

shown in figure 5.1 and eye movements were recorded. Participants were instructed to close their eyes while combinations are changed. First three combinations were presented for 15 seconds each and combinations from four to eight were presented for 9 seconds each such that every product in a combination gets 3 seconds for viewing. After recording and saving the video data of each participant, scan path and heat map on area of interest (AOI) were evaluated using SMI Be-gaze 0.3 software. At the end of eye tracking experiment, each participant was asked to give verbal responses regarding their product choice and the responses were recorded manually.



Figure 5.11 Heat maps of Stimulus shown in Virtual mode

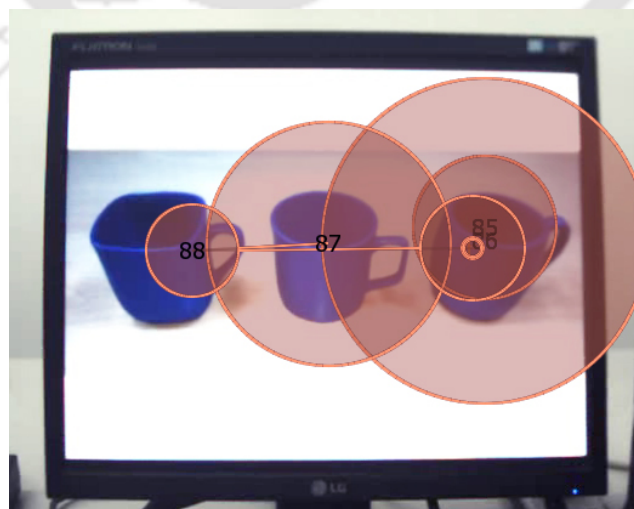


Figure 5.12 Scan Path of Stimulus shown in Virtual mode

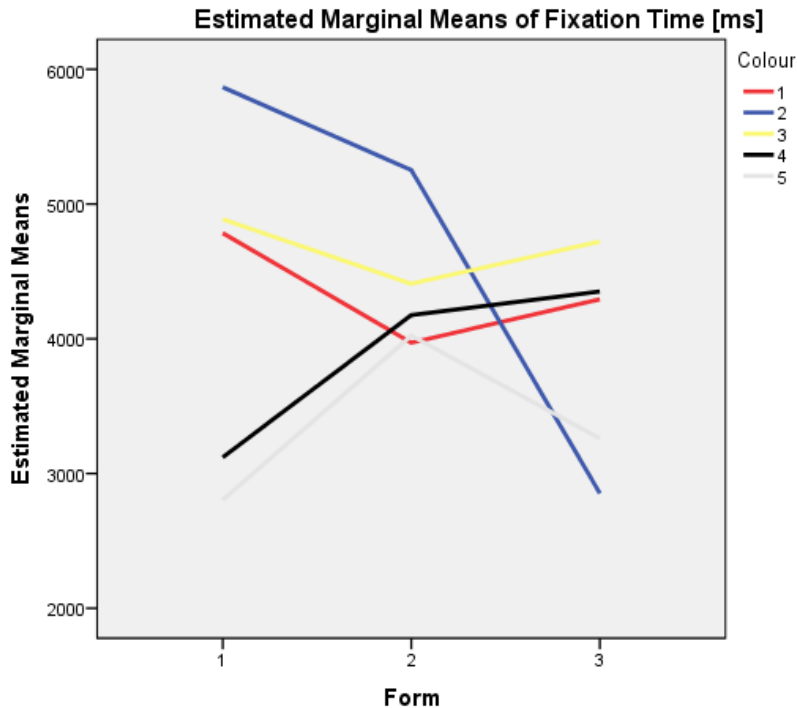
3.3 Results and Observations

One-way MANOVA was adopted to check significant variation in product choice among different products for colour preference and form preference. In MANOVA, all fifteen products were considered as independent variables and eye-tracking parameters related to visual attention (fixation counts and fixation duration) were considered as dependent variables. It is known from the literature that visual attention is directly proportionate to the product choice, which means that if the visual attention of a participant is high on a particular product then the chances of choosing that product is always high. Observation from statistical analysis (MANOVA) has been presented in Table 5.6 where $p < 0.05$ is considered as level of significance. Software used for analysis was SPSS 20. It is clear from Table 5.6 that there is significant difference in visual attention among all fifteen products regarding colour preference but there was no significant difference in case of form preference.

Table 5.6 Study-4: Significant differences for colour preference and form preference among the fifteen products in Product category-3 (Eye Tracking Study, Stimulus: Virtual Mode)

Study-4	Dependent Variable	Variation type	df (Hypothesis, Error)	F-value	Level of significance
Colour Preference	Fixation Count	Between Groups	4, 1484	8.197	0.001
	Fixation Time	Between Groups	4, 1484	3.905	0.004
Form Preference	Fixation Count	Between Groups	2, 1484	7.560	0.001
	Fixation Time	Between Groups	2, 1484	1.325	0.266
Colour * Form	Fixation Count	Between Groups	8, 1484	2.378	0.015
	Fixation Time	Between Groups	8, 1484	3.387	0.001

It was observed that mean fixation time was significantly higher in case of Blue Cuboid in comparison to other products (shown in Figure 5.13). To study if colour was more influential than form, correlation test was performed.



Covariates appearing in the model are evaluated at the following values: AOI Size [px] = 12953.21

Figure 5.13 Mean Fixation Time of all the products presented (virtual mode) in Study-4 during eye tracking study

Table 5.7 Study-4: Correlation coefficients among product choice, colour preference and form preference in Product category-3 when presented on-screen (n=750) (Eye Tracking Study)

Study-4	Product Choice	CP (Colour Preference)	FP (Form Preference)
Product Choice	1.000	.112**	.096**
CP (Colour Preference)	.112**	1.000	.244**
FP (Form Preference)	.096**	.244**	1.000

** . Correlation is significant at the 0.01 level (2-tailed).

Correlation values of product choice with respect to colour and product choice with respect to form were analysed (Table 5.7). Choice of colour and form of products was interpreted from fixation time which is a visual attention related eye-tracking parameter. Software used for analysis was SPSS 20. Correlation coefficient were compared and the analysis revealed that colour is more influential than form in Product category-3 where Tea cups were presented as stimulus.

3.4 Discussion:

Preference towards colour and form for a specific product was studied separately keeping one constant while other varying (for example, stimuli was

presented with cups of same colour but with different forms). Following these two separate experiments, interaction effect of colour and form in choice making of product was checked using statistical technique MANOVA. It was observed that there is significant interaction effect of colour and form in product choice (See Table 5.4, 5.6).

Data collected from questionnaire were subjected to statistical analysis (one-way ANOVA, SPSS 20.0) and it was observed that there were significant variations among 15 different cups for visual attractiveness, colour preference and form preference. Data collected from eye tracking experiments (both physical and virtual mode of stimulus presentations) were analysed with MANOVA to check significant variation in product choice among 15 cups for colour preference and form preference. In MANOVA, all fifteen cups were considered as independent variables and eye-tracking parameters related to visual attention (fixation counts and fixation duration) were considered as dependent variables. It was observed that there was significant difference ($p < 0.05$) in visual attention among all fifteen cups regarding colour preference but there was no significant difference in case of form preference. Moreover, between groups significant interaction effect of colour and form in terms of visual attention (fixation count and fixation time) disclosed that colour and form together played decisive role in determining visual attractiveness of a product (Labrecque and Milne, 2012; Liang *et al.*, 2013; Westland and Shin, 2015). Further, correlation statistics revealed that both visual attention (fixation time) towards colour and form were significantly correlated with product choice. Higher value of the correlation coefficient between visual attention towards colour (fixation time) and product choice than the correlation coefficient between visual attention towards form (fixation time) and product choice, indicated that colour was more influential than form in product choice.



Chapter 6

General Discussion and Conclusion of the overall Thesis

Chapter abstract: Consolidated findings of the research experiments have been presented in this chapter. Results of all the four studies have been highlighted and discussed in detailed. All the three hypotheses have been tested and discussed. Findings from the current investigation reveal that colour and form preference varies significantly with different categories of products. It was proved that colour and form preference differs significantly when products are viewed in virtual mode and physical mode. The information regarding 'preference of colour and form in product selection' that has been depicted in present thesis is of importance to design studios, design schools and marketers. Moreover, the research methodology followed can be a guide while performing similar research. A reference database having consumer (Indian Consumers: Undergraduate and Postgraduate students from a premier higher education institution) preferences of colour and form among different product categories is developed that can serve as a ready manual providing the design methodology to conduct similar colour and form studies. In this chapter, the key contributions of this thesis have been presented. Limitations of this research and the future scope of work have been highlighted.

1 Introduction

Consumers' product choice is influenced by product's physical appearance to a great extent apart from the purchase motivation through technical competence and fit for use (Chuang *et al.*, 2001; Yadav *et al.*, 2013). Product's market share is influenced by product aesthetics and it is prudent to incorporate in the human factors research process (Liu, 2003b). Researchers found that vision is the most vital sense in the product-buying experience (Fenko *et al.*, 2010). Therefore, understanding the visual interest of consumers is very important. Visual interest is influenced by the product's physical attributes (Yoo and Kim, 2014) or physical properties as discussed in the previous sections. Blijlevens *et al.*, 2009, described a two-step model of product appearance perception. They mentioned that product's physical properties like colour (hue, saturation, combinations), shape (round, rectangular), texture, surface, size, contrast, symmetry, orientation, weight etc. create a perception of modernity, simplicity, unity etc. (Blijlevens *et al.*, 2009). Product elements such as colour, form, materials, ornamentation, and texture contributes to product's physical attractiveness (Seva and Helander, 2009). Among these attributes, colour and form influences consumer the most as discussed in the earlier sections (Chapter-1 &2) (Crilly *et al.*, 2009; Labrecque and Milne, 2012; Liang *et al.*, 2013; Westerman *et al.*, 2013; Westland and Shin, 2015). The physical properties elicit certain appearance attributes which are

contextual depending on the category of the product. Since we buy different products for different use, we perceive them differently and our visual evaluation differs depending on the context and category of the product.

Therefore, preference of colour and form among different product categories may differ. It is found that there is rarely reported literature regarding how consumers make choice of colour and form while planning to purchase a product. Information is also scarce concerning how consumers' preference of colour and form varies from one product category to another. In the present research, colour and form preference by Indian Consumers (Undergraduate and Postgraduate students from a premier higher education institution) among different product categories is studied with the support of empirical approach. Generation Y students have been considered as the sample group because they are most influenced by interesting products and they represent a lucrative marketing opportunity (Beatty and Talpade, 1994; Müller *et al.*, 2014; Sane and Chopra, 2014). It is also known from the recent studies that product colour is more important among young adults than older population (Akçay *et al.*, 2012).

In the current research, preference towards products' physical attributes was studied and analyzed using subjective evaluation through psychological questionnaires as well as objective measurement known for visual perception based studies called eye-tracking. In questionnaires a suitable measurement scale was constructed aiming at the preference study which is associated to visual attractiveness, likeliness for colour and form, product purchase intentions, etc. Researchers have often used seven-point rating scales for similar studies (Carbon and Talker, 2006a; Carbon, 2010; Mugge and Schoormans, 2012). Studying visual behavior of consumers during product selection process is very essential in marketing research as colours and shapes convey about 80 % of all visual information (LaCroix, 1998) as stated earlier in 'Introduction' section. Thus, among various objective evaluations for product choice, now-a-days 'eye tracking' techniques are being widely used by marketing researchers (Duchowski, 2007; Kowler, 2011; Khalighy *et al.*, 2015). This technique is used since it is capable of capturing visual attention and visual scanning behavior of consumers on products by recording eye-movements (Gulliver and Ghinea, 2004; Kukkonen, 2005; Tzanidou, 2006; Zambarbieri *et al.*, 2008; Marshall, 2009; Carbon, 2010; Tonkin *et al.*, 2011). Eye tracking variables such as Fixation duration and Fixation counts were the metrics used for evaluation of area of interest (AOI) and perception of viewers as discussed in Chapter-2. In the present research, eye tracking based studies were performed to

observe preference of colour and form across different product categories to bring out quantitative data that helped augmenting valid results.

In the current research, four distinct studies were performed to achieve potential answers for the research questions that have been mentioned in Chapter-1, Section 1.3). For each of the study, both questionnaire survey as well as eye tracking technique was applied to acquire information. Responses from both were deliberated to draw conclusions regarding the final results. In the first study (Study-1) where fondness among primary colours and their variations (variation in their saturation value) was experimented, B1 (refer Table 2.1 for meaning of the code) was observed to be preferred the most among the participants. It was also observed that from the set of R0 R1 R2, R1 was most preferred and from the set of Y0 Y1 Y2, Y1 was most preferred. From here it can be said that colours with saturation value 60 (Chapter-2, Table 2.1) have more fondness than the colours with saturation values 20 and 100 (Figure 6.1).

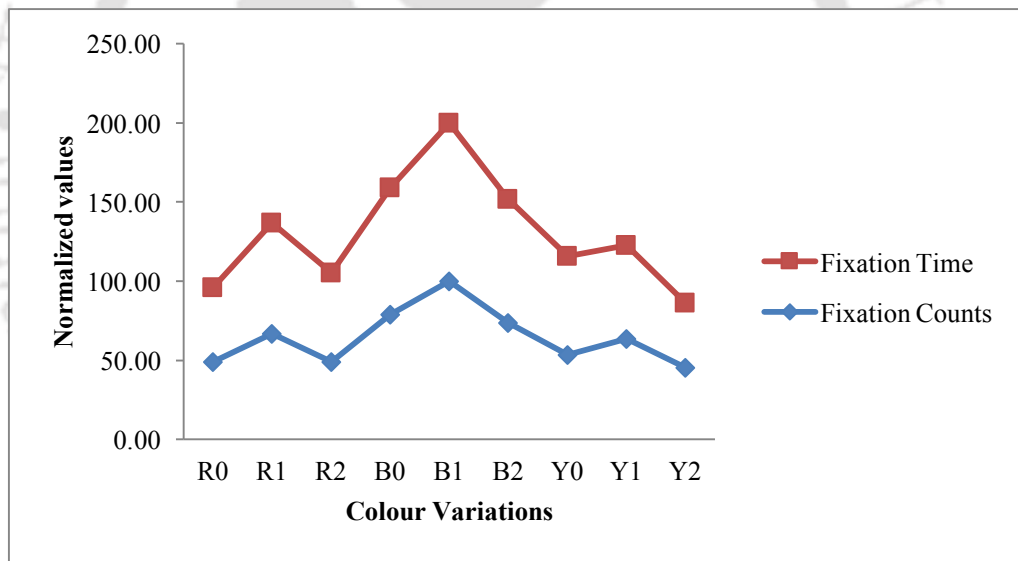


Figure 6.1 Normalized values of fixation counts and fixation time for different colour variations in Study-1

Though it was known from Study-1 that colours with saturation value 60 are more preferred than colours with saturation value 20 and 100, for Study-2, 3 and 4, primary colours from RYB model were chosen for colouring the stimulus. This was because inferences that were derived from Study-1 were from study of colour patches while in case of other studies, colours needed to be applied on three different categories of products. The context of Study-1 and Study-2, 3 and 4 are different therefore it is further justified to start a new experiment with a set of primary colours and not with

variations of its hue, saturation or brightness. In Study-2, 3 and 4, attempts were made to determine the influence of colour and form, taking three different categories of products as stimulus. The following section will discuss the major research findings of those studies.

2 Research Findings and Testing of Hypotheses

Research assumptions were formulated and experimental research was organized accordingly for obtaining results that can best cater in order to comprehend assumptions made. There were four studies performed Study-1, 2, 3 and 4.

Study-1: To study the preference of colour among a few primary colours

In Study-1, it was intended to observe the fondness among primary colours (RYB colour model) and their variations (variation in their saturation value). Three experiments were done under this study (Chapter-2). The first experiment (Experiment-1) was questionnaire based where square shaped colour patches of primary colours (RYB colour model) and their colour variations (variation in their saturation value) were presented as stimulus. It was observed that among 60 participants, 5% belonged to the group where participants preferred a particular colour among red, yellow and blue when verbally asked and also preferred colour variations under that particular colour alone when visual stimulus was displayed. Whereas, the rest 95% participants preferred distinctly different colour variations (due to change in saturation value). It was also observed that B1 (Blue colour with 60 as saturation value) was most preferred among all the colours presented. The same was tested in Experiment-2 using eye tracking technique to understand the relationship between the area of interest (AOI) of the participant and their manual ranking. Here, all the nine colours were shown in a visual presentation and responses were recorded. Eye tracking results showed that the fixation time and fixation counts were maximum for B1. Since it is known that people look more or pay more visual attention on their area of interest, it can be concluded through the eye tracking study that B1 is the more preferred colour. In the stimulus presented in Experiment-2, B1 was placed in the middle of the visual stimulus. It was not clear whether B1 was most visited due to its central placement or merely due to the fondness. Therefore, Experiment-3 was conducted where the stimulus had colours shuffled and B1 was placed in nine different positions. Yet again, it was found that B1

was most preferred therefore it was concluded that B1 was the most preferred colour irrespective of its position in the presented stimulus.

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1).

In Study-2, it was intended to observe which among colour and form is most preferred product attribute in a set of fifteen products with non-recognisable function. Here, eight combinations of products with basic geometric forms (cuboid, cylinder and sphere) and primary colours (RYB colour model), along with black and white were presented (Chapter-3). This study was performed using questionnaires (Experiment-1) and Eye-Tracking Technique (Experiment-2). In both the experiments, products were presented in physical mode. In Experiment-1, where questionnaire responses were analysed, it was reported from Correlation Test that colour was more preferred than form while choosing the products. It was also reported through LSD (Least Significant Difference) test that Red Sphere was most preferred among all the fifteen products. In Experiment-2, where eye tracking responses (fixation time) were analysed, it was reported from Correlation Test that colour was more preferred than form while choosing the products. It was also reported that Red Sphere was most preferred among all the fifteen products. From both the experiments (Questionnaire study and Eye tracking study) it was found that in case of products with non-recognisable function (involved in this research), colour was more preferred than form.

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2).

In Study-3, it was intended to observe which among colour and form is most preferred product attribute in a set of fifteen products with recognisable function. Here, USB Flash drives in combination of eight with basic geometric forms (cuboid, cylinder and sphere) and primary colours (RYB colour model), along with black and white were presented (Chapter-4). This study was performed using questionnaires (Experiment-1) and Eye-Tracking Technique (Experiment-2). In both the experiments, products were presented in physical mode. In Experiment-1, where questionnaire responses were analysed, it was reported from a Correlation Test that form was more preferred than colour while choosing the products. It was also reported through LSD (Least Significant Difference) test that Black Cuboid was most preferred among all the fifteen products. In Experiment-2, where eye tracking responses (fixation time) were analysed, it was

reported from a Correlation Test that form was more preferred than colour while choosing the products. It was also reported that Black Cuboid was most preferred among all the fifteen products. From both the experiments (Questionnaire study and Eye tracking study) it was found that in case of products with recognisable function (USB Flash Drives involved in this research) form was more preferred than colour.

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product category-3).

In Study-4, it was intended to observe which among colour and form is most preferred product attribute in a set of fifteen products with recognisable function. Here, tea cups in combinations of eight with basic geometric forms (cuboid, cylinder and sphere) and primary colours (RYB colour model), along with black and white were presented (Chapter-5). This study was performed using questionnaires (Experiment-1) and Eye-Tracking Technique (Experiment-2 and Experiment-3). In Experiment-1 and Experiment-2, products were presented in physical mode, whereas in Experiment-3, products were presented in virtual mode. In Experiment-1, where questionnaire responses were analysed, it was reported from Correlation Test that colour was more preferred than form while choosing the products. It was also reported through LSD (Least Significant Difference) test that White Sphere was most preferred among all the fifteen products. In Experiment-2 and Experiment-3, where eye tracking responses (fixation time) were analysed, it was reported from Correlation Test that colour was more preferred than form in both virtual mode and physical mode of presentation. In Experiment-2, it was also reported that Black Sphere was most preferred among all the fifteen products which is second most preferred in case of Experiment-1. In Experiment-3, it was also reported that Blue Cuboid was most preferred among all the fifteen products. From all the three Experiment-1, 2 and 3, it was found that in case of products with recognisable function (Tea cups involved in this research) colour is more preferred than form.

From the study, it has been observed that in product category-1 and product category-3 colour was more influential than form and in product category-2 form was more influential than colour (Refer Figure 6.2). Therefore, it can be empirically reported that among colour and form, the most preferred product attribute varies across product categories.

Table 6.1 Preferences across three product categories

Preference of participants	Product Category-1		Product Category-2		Product Category-3		
	Stimulus presented in Physical Mode		Stimulus presented in Physical Mode		Stimulus presented in Physical Mode		Stimulus presented in Virtual Mode
	Questionnaire Study	Eye Tracking Study	Questionnaire Study	Eye Tracking Study	Questionnaire Study	Eye Tracking Study	Eye Tracking Study
Most Preferred Product	Red Sphere	Red Sphere and Yellow Sphere	Black Cuboid	Black Cuboid	White Sphere and Black Sphere	Black Sphere	Blue Cuboid
Least Preferred Product	Yellow Cuboid	Black Cylinder	Blue Sphere	Black Sphere	Yellow Cuboid	Blue Sphere and Blue Cuboid	Blue Sphere and White Cuboid
Product Choice due to dominance of Colour / Form	Colour	Colour	Form	Form	Colour	Colour	Colour

While choosing a product, influence of colour and form depends on the category of products and this difference in colour and form preference could be due to variation in specific application of the product. There is a pattern of events that is experienced by the consumers. It is reported that colours and forms influence the most in visual behavior of consumers as discussed in Chapter-1 and Chapter-2. Colour and form can attract consumers visually, influencing product choice and thereby creating a purchase intension. It is known from earlier studies that product's commercial success depends on its visual appearance (Crilly *et al.*, 2004). Therefore, visual attractiveness influences product choice and motivates consumers to purchase the product. The product selection process can be analyzed in a step by step process shown in Figure 6.3.

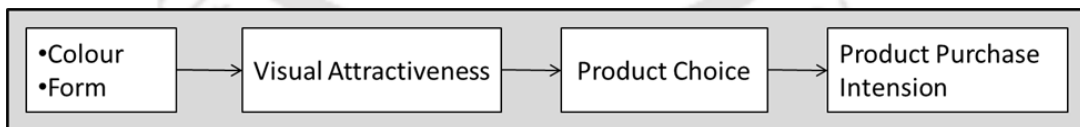


Figure 6.2 Analysing the product selection process of consumers

2.1 Testing of Hypotheses

In Hypothesis-1, it was assumed that “*Colour is more significantly correlated with product choice as compared to form*”. From Study-2, 3 and 4, it has been observed that in product category-1 (Products with non-recognisable function) and product category-3 (Products with recognisable function: Tea cups) colour was found to be more influential product attribute than form. This was evident from the significantly

higher correlation coefficient between colour and product choice in comparison to form and product choice (See Chapter-3, Section-1.3, Table-3.4 and Chapter-5, Section-1.3, Table-5.3). In product category-2, where products with recognisable function (USB Flash drives) were presented as the stimulus, form was found to be more influential product attribute than colour (See Chapter-4, Section- 1.3, Table-4.3).

From Table 6.1, it is evident that in most cases (both questionnaire study and eye tracking study) correlation between colour preference and product choice as well as correlation between form preference and product choice were found to be significant. Results from correlation statistics (refer Table 6.1), depict that colour is not always the most influential product attribute than form and influence of colour and form depends on the category of products. Thus hypothesis-1 is not accepted for all categories of products. This could be due to the influence of utility aspect that came in to the minds of the participants. Consumers buy different products for different use, they perceive product's physical attributes differently and their aesthetic appraisal differs depending on the product category.

Table 6.2 Correlation Coefficient values of product choice with respect to colour and product choice with respect to form in Product category-1, 2 and 3

Product Category	Product Choice with respect to Colour and Form Preference	Questionnaire Study (Correlation Coefficient)	Eye Tracking Study (Correlation Coefficient)
Product Category-1	Colour Preference & Product Choice	.170**	.074*
	Form Preference & Product Choice	.151**	.022
Product Category-2	Colour Preference & Product Choice	.148**	.045
	Form Preference & Product Choice	.173**	.216**
Product Category-3	Colour Preference & Product Choice	.184**	.147**
	Form Preference & Product Choice	.105**	.104**

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

In Hypothesis-2, it was assumed that “*Colour and form selection significantly varies across different categories of products*”. One-way ANOVA was performed to find out if colour and form selection significantly varies with different categories of products and it was observed that both colour preference and form preference significantly varies across three different categories of products (Table 6.2).

Table 6.3 Significant differences for colour preference and form preference among three different categories of products (One-way ANOVA) (for hypothesis-2)

Hypothesis-2	Variation type	df (s)	F-value	Level of significance
Colour Preference	Between Groups	2	13.823	0.001
Form Preference	Between Groups	2	5.894	0.003

Therefore, from one-way ANOVA, it can be stated that hypothesis-2 is well accepted. From LSD tests, performed in Study-2, 3 and 4, it was observed that in product category-1 and product category-3, sphere was most preferred where as in product category-2 (USB Flash drives) cuboid was most preferred. In case of colour preference, from questionnaire and eye tracking study together, in product category-1, red and yellow were most preferred, in product category-2, black was most preferred and in product category-3, white, black and blue were among the most preferred.

In Hypothesis-3, it was assumed that “*There is significant variation in the preference of colour and form of a product while it is presented on-screen and presented in physical mode*”. One-way ANOVA was performed to find out if there was significant variation in the preference of colour and form of a product while it is presented on-screen and presented in physical mode. It was observed that there was significant variation in the preference of both colour and form of a product while it is presented on-screen and presented in physical mode (Table 6.3).

Table 6.4 Significant differences for colour preference and form preference among two different modes of product presentation (One way ANOVA) (for hypothesis-3)

Hypothesis-3	Variation type	df (s)	F-value	Level of significance
Colour Preference	Between Groups	1	91.606	0.001
Form Preference	Between Groups	1	104.155	0.001

There was observable similarity found from the correlation tests done individually in Experiment-2 and 3 of Study-4 in Chapter-5, Table-5.5 and Table-5.7) It was observed that colour was more influential product attribute than form in case of virtual presentation as well as physical presentation. From Statistical inferences, both from one-way ANOVA and correlation, it can be stated that hypothesis-3 is well accepted. But the most preferred product is not the same. When products were presented in physical mode, the most preferred product was Black Sphere and in virtual mode, the most preferred product was Blue Cuboid. Probably, this happened as visual

perception in case of physical mode is different from the virtual mode. Besides, experiments were designed and targeted for retrieving which among colour and form is more influential product attribute while making a product choice and there was less emphasis on finding the most preferred product.

3 Key Contributions of Present Thesis

1. Establishment of preference towards different primary colours (RYB colour model) due to varying saturation value, among Indian Consumers (Undergraduate and Postgraduate students from a premier higher education institution of India) based on empirical evidences.

The research described in the present thesis is first of its kind to establish the above mentioned fact by experimental data. Observations of current research revealed that most of the participants (95%) chose different colour variations (due to varying saturation value) of different primary colours rather than choosing variations under a single primary colour which they earlier chosen as their favourite colour among primary colours when asked verbally. This observation is of vital importance from marketing research point of view. It was noticed that if the presented blue did not match with the kind of blue in the participants' mind, then they intended to choose other alternative colour. Therefore, it cannot be taken blindly that any blue will be most preferred since many studies from reported literature suggest that blue is the most preferred colour. It is important to know specifically the kind of blue and should be worked on if it can fit the context explicitly. Current research involved both questionnaire study and an eye tracking study to establish empirically the primary colour preference among participants.

2. Establishment of colour and form preference by Indian Consumers (Undergraduate and Postgraduate students from a premier higher education institution of India) among different product categories based on empirical evidences.

Based on market survey using subjective evaluation (e.g. questionnaire), researchers dealing with consumer behavior, marketing strategies, product planning etc. have reported (Singh, 2006; Krishna, 2011; Kumar, 2016) that consumers'

preferences towards colour or form varies across product categories but the same has rarely been objectively evaluated or established based on empirical evidences. Moreover, there is rarely any reported literature regarding ‘which is more influential (or correlated with) in product selection between colour and form?’ These unexplored areas received significant light after the current research. Studying the preference of colour and form among different product categories among Indian consumers (Undergraduate and Postgraduate students from a premier higher education institution) through experimental evidences has been attempted for the first time. It has been revealed that colour is always not preferred over form; and vice-versa differs with change in category of the product. It may depend on the product’s functionality, purpose of use and context of use. This research also brought to light empirically that the preference of colour and form varies when mode (virtual and physical) of presentation changes. According to user centered design practice, it is always advantageous to know the users/ consumers desire before product design and product launch. This can facilitate marketers to serve for the users’ desires and they could also predict the product acceptance before marketing the product. Also, there could be less chance of product failure in the market. If designers consider consumers’ product decision making based on product attributes, there is more chance of product acceptance in the market. The upshot data produced regarding the preferences of colour and form among different categories would be useful to product designers and marketing managers to formulate design strategies.

3. Appraised design methodology to conduct research on consumer preference in colour and form selection for products.

The current research involved detailed studies with both subjective and objective measurement techniques of consumer’s preference. In case of subjective preference, standard questionnaires were used whereas for the objective/quantitative technique, visual attention analysis using eye tracking technique was adopted. Data analysis was done using both descriptive and inferential statistics. The research methodology followed in this thesis can guide similar colour and form studies involving different other products. This can also serve as reference for studies involving other product attributes. This kind of methodology could be utilized by market researchers for attractiveness evaluation

of the product. To some extent, this could be helpful in predicting the market acceptance of the product.

4. Development of a reference database having consumer (Indian Consumers: Undergraduate and Postgraduate students from a premier higher education institution) preferences of colour and form among different product categories.

The present research provides information regarding the most preferred to least preferred colours and forms among the five colours and three forms presented in the experiments. For experimental purposes, three product categories (product with non-recognisable function, and two types of products with recognisable function, namely USB flash drives and tea cups), were considered. The outcome produced regarding the preferences of a few colours colour and forms among different categories of products under the study, would be useful to product designers and marketing managers to formulate design strategies. The thesis can serve as a ready reference by providing direct information about what kind of colours and forms to be used for gaining the attention of the young-adult consumers in India.

4 Limitations of Present Research and Future Scope of work

The research plan and the experimental design were prepared in the best possible way with modifications done after the pilot study. There are confinements for this study due to the reason that understanding product choice is complex and studying physical attributes of products like colour and form is a multifaceted affair.

1. Only five colours (primary colours: red, blue, yellow from RYB colour model, black and white) were chosen for present research. For further research, secondary colours, tertiary colours and more colour variations of RYB colour model can be considered. Preferences towards colours from other colour models; RGB and CMYK can also be explored in future.
2. Only three basic geometric forms (cuboid, cylinder and sphere) were involved in the present thesis. Further, other geometric forms and organic forms can be explored.

3. Present study focuses on a particular age group (18-25years). Similar studies can be performed on different age groups which might yield different results.
4. Sample population of the current research was limited to 100 or 50 volunteers for each of the individual experiments. Further studies involving a larger sample size might be attempted that can deliver more reliable results.
5. In the present research, experiments were carried out only for colour and form preferences where all the other physical attributes were kept constant. Hence, in Product category-1 (products with non-recognisable function) and Product category-2 (USB Flash drives) size of both the products were kept almost similar but in case of Product category-3 (Tea Cups) it was not possible to keep the size similar to earlier two product categories. Therefore, there may be influence of product size in colour and form preferences due to variation of sizes across three product categories under this research. Similar studies performed by controlling the size of the products across all categories may show different results.
6. Questionnaires and Eye Tracking were the only instruments used in this research. Other experimental techniques such as EEG (Electroencephalography) and MRI (Magnetic Resonance Imaging) could be used for further study.
7. Colour and form were the only physical attributes which were considered. Even though colour and form are the most influential physical attributes of products while consumers are making product selection, there is obvious influence of other physical attributes such as texture, brand labels, store ambience etc. Further studies considering all these physical attributes can give new insights.



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Appendix- 1A

Questionnaire: Product Category- 1

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

Questionnaire 1.1: Visual Stimulus



1:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in
"CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box
below)

.....

3. Gender

Check all that apply.

☐

Male

☐

Female

4. Email

(Please enter your email id in the
box below)

.....

5. Mobile number

(Please enter your mobile number in
the box below)

.....

6. Permanent Address

.....

7. Present Address

.....

8. **I am volunteering to participate in this experiment.**

(Please choose one of the options below)

Check all that apply.☐ Yes☐ No9. **1: What is your order of preference among the following? (cuboids)**

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
red	☐	☐	☐	☐	☐
blue	☐	☐	☐	☐	☐
yellow	☐	☐	☐	☐	☐
black	☐	☐	☐	☐	☐
white	☐	☐	☐	☐	☐

10. **2: Is this product visually appealing? (Red Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

11. **3: Is this product visually pleasing? (Red Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

12. **4: Is this product visually appealing? (Blue Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

13. **5: Is this product visually pleasing? (Blue Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

14. **6: Is this product visually appealing? (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

15. **7: Is this product visually pleasing? (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

16. **8: Is this product visually appealing? (Black Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

17. **9: Is this product visually pleasing? (Black Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

18. **10: Is this product visually appealing? (White Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

19. **11: Is this product visually pleasing? (White Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

20. **12: I am likely to choose this product due to its colour. (red cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **13: I am likely to choose this product due to its form. (red cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

22. **14: I am likely to choose this product due to its colour. (blue cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

23. **15: I am likely to choose this product due to its form. (blue cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

24. **16: I am likely to choose this product due to its colour. (yellow cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

25. **17: I am likely to choose this product due to its form. (yellow cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

26. **18: I am likely to choose this product due to its colour. (black cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

27. **19: I am likely to choose this product due to its form. (black cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

28. **20: I am likely to choose this product due to its colour. (white cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

29. **21: I am likely to choose this product due to its form. (white cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1A

Questionnaire: Product Category- 1

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

Questionnaire 1.2: Visual Stimulus



2:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. **Name**

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. **Age (in years)**

(Please enter your age in the box below)

.....

3. **1: What is your order of preference among the following? (cylinders)**

(please rank one each, where 5 is less likely and 1 is more likely)
Mark only one oval per row.

	1	2	3	4	5
red	☐	☐	☐	☐	☐
blue	☐	☐	☐	☐	☐
yellow	☐	☐	☐	☐	☐
black	☐	☐	☐	☐	☐
white	☐	☐	☐	☐	☐

4. **2: Is this product visually appealing? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. **3: Is this product visually pleasing? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: Is this product visually appealing? (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

11. **9: Is this product visually pleasing? (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

12. **10: Is this product visually appealing? (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

13. **11: Is this product visually pleasing? (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

14. **12: I am likely to choose this product due to its colour. (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: I am likely to choose this product due to its colour. (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: I am likely to choose this product due to its form. (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: I am likely to choose this product due to its colour. (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: I am likely to choose this product due to its form. (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: I am likely to choose this product due to its colour. (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **19: I am likely to choose this product due to its form. (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

22. **20: I am likely to choose this product due to its colour. (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

23. **21: I am likely to choose this product due to its form. (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1A

Questionnaire: Product Category- 1

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

Questionnaire 1.3: Visual Stimulus



3:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. **Name**

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. **Age (in years)**

(Please enter your age in the box below)

.....

3. **1: What is your order of preference among the following? (Spheres)**

(please rank one each, where 5 is less likely and 1 is more likely)
Mark only one oval per row.

	1	2	3	4	5
red	☐	☐	☐	☐	☐
blue	☐	☐	☐	☐	☐
yellow	☐	☐	☐	☐	☐
black	☐	☐	☐	☐	☐
white	☐	☐	☐	☐	☐

4. **2: Is this product visually appealing? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. **3: Is this product visually pleasing? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: Is this product visually appealing? (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

11. **9: Is this product visually pleasing? (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

12. **10: Is this product visually appealing? (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

13. **11: Is this product visually pleasing? (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

14. **12: I am likely to choose this product due to its colour. (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: I am likely to choose this product due to its colour. (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: I am likely to choose this product due to its form. (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: I am likely to choose this product due to its colour. (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: I am likely to choose this product due to its form. (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: I am likely to choose this product due to its colour. (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **19: I am likely to choose this product due to its form. (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

22. **20: I am likely to choose this product due to its colour. (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

23. **21: I am likely to choose this product due to its form. (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1A

Questionnaire: Product Category- 1

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

Questionnaire 1.4: Visual Stimulus



4:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in
"CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box
below)

.....

3. 1: What is your order of preference among the following? (reds)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
cuboid	☐	☐	☐	☐	☐
cylinder	☐	☐	☐	☐	☐
sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (Red Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (Red Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (red cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (red cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (red cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (red cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

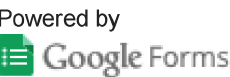
	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely



Appendix- 1A

Questionnaire: Product Category- 1

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

Questionnaire 1.5: Visual Stimulus



5:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in
"CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box
below)

.....

3. 1: What is your order of preference among the following? (blue)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
cuboid	☐	☐	☐	☐	☐
cylinder	☐	☐	☐	☐	☐
sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (Blue Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (Blue Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (Blue cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (Blue cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (Blue cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (Blue cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1A

Questionnaire: Product Category- 1

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

Questionnaire 1.6: Visual Stimulus



6:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in
"CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box
below)

.....

3. 1: What is your order of preference among the following? (Yellow)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
cuboid	☐	☐	☐	☐	☐
cylinder	☐	☐	☐	☐	☐
sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (Yellow Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (Yellow Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (Yellow cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (Yellow cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (Yellow cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (Yellow cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

Appendix- 1A

Questionnaire: Product Category- 1

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

Questionnaire 1.7: Visual Stimulus



7:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in
"CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box
below)

.....

3. 1: What is your order of preference among the following? (Black)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
cuboid	☐	☐	☐	☐	☐
cylinder	☐	☐	☐	☐	☐
sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (Black Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (Black Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (Black cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (Black cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (Black cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (Black cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

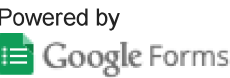
	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely



Appendix- 1A

Questionnaire: Product Category- 1

Study-2: To study the preference of colour and form in a set of products with non-recognisable function (Product category-1)

Questionnaire 1.8: Visual Stimulus



8:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box below)

.....

3. 1: What is your order of preference among the following? (White)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
cuboid	☐	☐	☐	☐	☐
cylinder	☐	☐	☐	☐	☐
sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (White Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (White Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. 4: Is this product visually appealing? (White Cylinder)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (White cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (White cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (White cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (White cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (White Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 morelikely

15. **13: I am likely to choose this product due to its form. (White Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 morelikely

16. **14: What is your order of preference among the following?**
(please rank each of the following)
Mark only one oval per row.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
red cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
red cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
red sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
blue cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
blue cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
blue sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
yellow cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
yellow cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
yellow sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
black cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
black cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
black sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
white cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
white cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
white sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Appendix- 1B

Questionnaire: Product Category- 2

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Questionnaire 2.1: Visual Stimulus



2.1: This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in
"CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box
below)

.....

3. Gender

Check all that apply.

☐

Male

☐

Female

4. Email

(Please enter your email id in the
box below)

.....

5. Mobile number

(Please enter your mobile number in
the box below)

.....

6. Permanent Address

.....

7. Present Address

.....

8. **I am volunteering to participate in this experiment.**

(Please choose one of the options below)

Check all that apply.

☐ Yes

☐ No

9. **a: For how long have you had a USB flash drive?**

(Please choose one of the options below)

Check all that apply.

☐ 5-10 years

☐ 1-5 years

☐ 0-1 year

10. **b: How often do you use a USB flash drive?**

(Please choose one of the options below)

Check all that apply.

☐ Daily

☐ Weekly

☐ Fortnightly

☐ Monthly

☐ Hardly

☐ None at all

11. **0: Which among the following will you consider while purchasing a USB flash drive?**

(please rank one each, where 7 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5	6	7
Colour	☐	☐	☐	☐	☐	☐	☐
Brand	☐	☐	☐	☐	☐	☐	☐
Form	☐	☐	☐	☐	☐	☐	☐
Price	☐	☐	☐	☐	☐	☐	☐
Material	☐	☐	☐	☐	☐	☐	☐
Size	☐	☐	☐	☐	☐	☐	☐
Texture	☐	☐	☐	☐	☐	☐	☐

12. **c: Which USB flash drive (model) do you currently own?**

(please mention brand, colour, memory and form)

.....

.....

.....

.....

.....

13. **1: What is your order of preference among the following? (cuboids)**

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
Red	☐	☐	☐	☐	☐
Blue	☐	☐	☐	☐	☐
Yellow	☐	☐	☐	☐	☐
Black	☐	☐	☐	☐	☐
White	☐	☐	☐	☐	☐

14. **2: Is this product visually appealing? (Red Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

15. **3: Is this product visually pleasing? (Red Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

16. **4: Is this product visually appealing? (Blue Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

17. **5: Is this product visually pleasing? (Blue Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

18. **6: Is this product visually appealing? (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

19. **7: Is this product visually pleasing? (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

20. **8: Is this product visually appealing? (Black Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

21. **9: Is this product visually pleasing? (Black Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

22. **10: Is this product visually appealing? (White Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

23. **11: Is this product visually pleasing? (White Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

24. **12: I am likely to choose this product due to its colour. (red cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

25. **13: I am likely to choose this product due to its form. (red cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

26. **14: I am likely to choose this product due to its colour. (blue cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

27. **15: I am likely to choose this product due to its form. (blue cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

28. **16: I am likely to choose this product due to its colour. (yellow cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

29. **17: I am likely to choose this product due to its form. (yellow cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

30. **18: I am likely to choose this product due to its colour. (black cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

31. **19: I am likely to choose this product due to its form. (black cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

32. **20: I am likely to choose this product due to its colour. (white cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

33. **21: I am likely to choose this product due to its form. (white cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

34. **22: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (red cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

35. **23: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (red cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

36. **24: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (blue cuboid)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

37. **25: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (blue cuboid)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

38. **26: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (yellow cuboid)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

39. **27: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (yellow cuboid)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

40. **28: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (black cuboid)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

41. **29: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (black cuboid)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

42. **30: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (white cuboid)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

43. **31: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (white cuboid)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1B

Questionnaire: Product Category- 2

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Questionnaire 2.2: Visual Stimulus



2.2:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. **Name**

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. **Age (in years)**

(Please enter your age in the box below)

.....

3. **1: What is your order of preference among the following? (cylinders)**

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
Red	☐	☐	☐	☐	☐
Blue	☐	☐	☐	☐	☐
Yellow	☐	☐	☐	☐	☐
Black	☐	☐	☐	☐	☐
White	☐	☐	☐	☐	☐

4. **2: Is this product visually appealing? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. **3: Is this product visually pleasing? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: Is this product visually appealing? (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

11. **9: Is this product visually pleasing? (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

12. **10: Is this product visually appealing? (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

13. **11: Is this product visually pleasing? (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

14. **12: I am likely to choose this product due to its colour. (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: I am likely to choose this product due to its colour. (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: I am likely to choose this product due to its form. (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: I am likely to choose this product due to its colour. (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: I am likely to choose this product due to its form. (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: I am likely to choose this product due to its colour. (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **19: I am likely to choose this product due to its form. (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

22. **20: I am likely to choose this product due to its colour. (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

23. **21: I am likely to choose this product due to its form. (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

24. **22: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

25. **23: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Red Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

26. **24: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Blue Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

27. **25: Suppose you wanted to buy a "USB flash drive" from market. How likely would you be to buy this product? (Blue Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

28. **26: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Yellow Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

29. **27: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Yellow Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

30. **28: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Black Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

31. **29: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Black Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

32. **30: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (White Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

33. **31: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (White Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1B

Questionnaire: Product Category- 2

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Questionnaire 2.3: Visual Stimulus



2.3:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. **Name**

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. **Age (in years)**

(Please enter your age in the box below)

.....

3. **1: What is your order of preference among the following? (spheres)**

(please rank one each, where 5 is less likely and 1 is more likely)
Mark only one oval per row.

	1	2	3	4	5
Red	☐	☐	☐	☐	☐
Blue	☐	☐	☐	☐	☐
Yellow	☐	☐	☐	☐	☐
Black	☐	☐	☐	☐	☐
White	☐	☐	☐	☐	☐

4. **2: Is this product visually appealing? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. **3: Is this product visually pleasing? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: Is this product visually appealing? (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

11. **9: Is this product visually pleasing? (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

12. **10: Is this product visually appealing? (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

13. **11: Is this product visually pleasing? (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

14. **12: I am likely to choose this product due to its colour. (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: I am likely to choose this product due to its colour. (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: I am likely to choose this product due to its form. (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: I am likely to choose this product due to its colour. (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: I am likely to choose this product due to its form. (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: I am likely to choose this product due to its colour. (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **19: I am likely to choose this product due to its form. (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

22. **20: I am likely to choose this product due to its colour. (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

23. **21: I am likely to choose this product due to its form. (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

24. **22: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

25. **23: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Red Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

26. **24: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Blue Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

27. **25: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Blue Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

28. **26: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Yellow Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

29. **27: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Yellow Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

30. **28: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Black Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

31. **29: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Black Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

32. **30: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (White Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

33. **31: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (White Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1B

Questionnaire: Product Category- 2

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Questionnaire 2.4: Visual Stimulus



2.4: This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box below)

.....

3. 1: What is your order of preference among the following? (Reds)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
Cuboid	☐	☐	☐	☐	☐
Cylinder	☐	☐	☐	☐	☐
Sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (Red Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (Red Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (Red Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (Red Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (Red Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Red Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Red Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Red Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Red Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Red Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Red Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **19: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Red Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1B

Questionnaire: Product Category- 2

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Questionnaire 2.5: Visual Stimulus



2.5: This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box below)

.....

3. 1: What is your order of preference among the following? (Blues)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
Cuboid	☐	☐	☐	☐	☐
Cylinder	☐	☐	☐	☐	☐
Sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (Blue Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (Blue Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (Blue Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (Blue Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (Blue Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Blue Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Blue Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Blue Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Blue Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Blue Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Blue Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **19: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Blue Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1B

Questionnaire: Product Category- 2

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Questionnaire 2.6: Visual Stimulus



2.6:This is a part of colour and form study

Please give responses for all questions/ statements given below

1. **Name**

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. **Age (in years)**

(Please enter your age in the box below)

.....

3. **1: What is your order of preference among the following? (Yellows)**

(please rank one each, where 5 is less likely and 1 is more likely)
Mark only one oval per row.

	1	2	3	4	5
Cuboid	☐	☐	☐	☐	☐
Cylinder	☐	☐	☐	☐	☐
Sphere	☐	☐	☐	☐	☐

4. **2: Is this product visually appealing? (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. **3: Is this product visually pleasing? (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Yellow Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Yellow Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **19: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Yellow Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1B

Questionnaire: Product Category- 2

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Questionnaire 2.7: Visual Stimulus



2.7: This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box below)

.....

3. 1: What is your order of preference among the following? (blacks)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
Cuboid	☐	☐	☐	☐	☐
Cylinder	☐	☐	☐	☐	☐
Sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (Black Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (Black Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. **4: Is this product visually appealing? (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (Black Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (Black Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (Black Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (Black Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Black Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Black Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Black Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Black Cylinder)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (Black Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

21. **19: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (Black Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

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Appendix- 1B

Questionnaire: Product Category- 2

Study-3: To study the preference of colour and form in a set of products with recognisable function: USB Flash drives (Product category-2)

Questionnaire 2.8: Visual Stimulus



2.8: This is a part of colour and form study

Please give responses for all questions/ statements given below

1. Name

(Please enter your name in "CAPITAL" letters in the box below)

.....

2. Age (in years)

(Please enter your age in the box below)

.....

3. 1: What is your order of preference among the following? (whites)

(please rank one each, where 5 is less likely and 1 is more likely)

Mark only one oval per row.

	1	2	3	4	5
Cuboid	☐	☐	☐	☐	☐
Cylinder	☐	☐	☐	☐	☐
Sphere	☐	☐	☐	☐	☐

4. 2: Is this product visually appealing? (White Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

5. 3: Is this product visually pleasing? (White Cuboid)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

6. 4: Is this product visually appealing? (White Cylinder)

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

7. **5: Is this product visually pleasing? (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

8. **6: Is this product visually appealing? (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

9. **7: Is this product visually pleasing? (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	more likely

10. **8: I am likely to choose this product due to its colour. (White Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

11. **9: I am likely to choose this product due to its form. (White Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

12. **10: I am likely to choose this product due to its colour. (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

13. **11: I am likely to choose this product due to its form. (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

14. **12: I am likely to choose this product due to its colour. (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

15. **13: I am likely to choose this product due to its form. (White Sphere)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

16. **14: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (White Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

17. **15: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (White Cuboid)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

18. **16: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

19. **17: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (White Cylinder)**

(please rate in the following scale where 1 is less likely and 7 is more likely)

Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 more likely

20. **18: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to purchase this product? (White Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 morelikely

21. **19: Suppose you wanted to buy a 'USB flash drive' from market. How likely would you be to buy this product? (White Sphere)**
(please rate in the following scale where 1 is less likely and 7 is more likely)
Mark only one oval.

	1	2	3	4	5	6	7	
less likely	☐	☐	☐	☐	☐	☐	☐	7 morelikely

22. **20: What is your order of preference among the following?**
(please rank each of the following)
Mark only one oval per row.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
red cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
red cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
red sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
blue cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
blue cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
blue sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
yellow cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
yellow cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
yellow sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
black cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
black cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
black sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
white cuboid	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
white cylinder	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
white sphere	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Appendix- 1C

Questionnaire: Product Category- 3

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Questionnaire 3.1: Visual Stimulus

Questionnaires under this study are similar to Study-3



Appendix- 1C

Questionnaire: Product Category- 3

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Questionnaire 3.2: Visual Stimulus

Questionnaires under this study are similar to Study-3



Appendix- 1C

Questionnaire: Product Category- 3

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Questionnaire 3.3: Visual Stimulus

Questionnaires under this study are similar to Study-3



Appendix- 1C

Questionnaire: Product Category- 3

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Questionnaire 3.4: Visual Stimulus

Questionnaires under this study are similar to Study-3



Appendix- 1C

Questionnaire: Product Category- 3

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Questionnaire 3.5: Visual Stimulus

Questionnaires under this study are similar to Study-3



Appendix- 1C

Questionnaire: Product Category- 3

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Questionnaire 3.6: Visual Stimulus

Questionnaires under this study are similar to Study-3



Appendix- 1C

Questionnaire: Product Category- 3

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Questionnaire 3.7: Visual Stimulus

Questionnaires under this study are similar to Study-3



Appendix- 1C

Questionnaire: Product Category- 3

Study-4: To study the preference of colour and form in a set of products with recognisable function: Tea cups (Product Category-3)

Questionnaire 3.8: Visual Stimulus

Questionnaires under this study are similar to Study-3



List of publications

1. **Reddy, S.M.**, Chowdhury, A., Chakrabarti, D. and Karmakar, S., 2015. Role of Colour and Form in Product Choice and Variation of Preferences Across Product Categories: A Review. ICoRD'15 – Research into Design Across Boundaries, Volume 2, Creativity, Sustainability, DfX, Enabling Technologies, Management and Applications 35, pp631-640, DOI 10.1007/978-81-322-2229-3_54, Springer Publications.
2. **Reddy, S. M.**, Chowdhury, A., Chakrabarti, D. and Karmakar, S., 2012. Need of visual behavioural study of Indian consumers. In: Proceedings of International Conference on Management and Behavioural Sciences (ICMBS-2012), 3rd June, 2012, Delhi, India.
3. **Reddy, S. M.**, Chakrabarti, D. and Karmakar, S., 2012. Emotion and Interior Space Design: An Ergonomic Perspective. Work. IOS Press, 1072-1078. DOI: 10.3233/WORK-2012-0284-1072.
4. Chowdhury, A., Karmakar, S., **Reddy, S.M.** and Ghosh, S. and Deb Kumar Chakrabarti 2014. Usability is more valuable predictor than product personality for product choice in human-product physical interaction. International Journal of Industrial Ergonomics, Elsevier, 44(5), 697-705.
5. Chowdhury, A., **Reddy, S. M.** and Karmakar, S., 2012. Mutated/ scrambled brand name and its impact on market. In: Proceedings of International Conference on Management and Behavioural Sciences (ICMBS- 2012), 3rd June, 2012, Delhi, India.
6. Chowdhury, A., Karmakar, S., **Reddy, S. M.**, Sanjog, J., Ghosh, S. and Chakrabarti, D., 2012. Visual attention analysis on mutated brand name using eye-tracking: A case study. Journal of World Academy of Science, Engineering and Technology, Issue-68, p. 1132-1135. (pISSN: 2010-376X, eISSN:2010-3778)
7. Chowdhury, A., Karmakar, S., **Reddy, S.M.**, Sanjog, J., Ghosh, S. and Chakrabarti, D., 2013. Product Personality Rating Style For Satisfaction Of Tactile Need Of Online Buyers -A human factors issue in the context of e-retailers' web-design. In: Proceedings of International Conference on Human Computer Interactions, 23-24th August, 2013, Saveetha University, Chennai, India.
8. Chowdhury, A., **Reddy, S. M.**, Chakrabarti, D. and Karmakar, S., 2015. Cognitive Theories of Product Emotion and Their Applications in Emotional Product Design,. ICoRD'15 – Research into Design Across Boundaries, Volume 2, Creativity, Sustainability, DfX, Enabling Technologies, Management and Applications 35, pp329-340, DOI 10.1007/978-81-322-2229-3_54, Springer Publications.