A framework for extending visual brands to new products

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Abstract

Visual design has become an increasingly important product differentiation tool for companies. By deploying a consistent visual design language that communicates brand-specific values, a company can foster recognition for its brand as a whole. When a brand seeks to launch a new product, it can take advantage of its established brand recognition, by extending its visual language to the new product. In doing so, the brand increases the new product’s ability to be recognized. Supportive branding tools for industrial designers are lacking, yet strategic decisions related to visual design have become increasingly important.

The objective of this thesis was to investigate how designers may extend a brand’s visual design language to new products in practice. A framework was derived based on established branding theory and on design research related to visual recognition. The aim was to derive a framework that could support designers in strategic decisions, while also leaving room for designers to express their individual creativity within a viable frame of reference. An experiment was conducted to assess the framework’s performance and designers’ attitudes towards it. In addition, designers’ own practical approaches to the task were explored. An expert panel was utilized to evaluate designers’ product drafts. The results indicate that designers, while applying the framework, designed products that communicated the target brands’ visual design language more clearly than without the framework, whereas no significant difference in the concepts’ creativity levels were found. Perceived advantages associated with the framework were usually linked to its structure and helpfulness in determining brands’ visual strategies. In order to strengthen the findings of this study, future research should explore the effectiveness of the proposed framework with larger sample sizes and additional means of evaluation. The framework may prove especially useful in educational settings, fostering designers’ ability to think about visual design in a strategic manner. As such, future experiments may be conducted at institutions offering educational programs within the field of industrial design.

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Introduction

1.1 Motivation

When walking through a store or searching the Internet looking for a specific product, customers are typically presented with several options - multiple companies produce their own version of a specific product. In today's competitive market place, consumers often have to choose between products with similar technical performance, quality, service, and price. As a consequence, recognition plays an increasingly crucial role.

A company can attain recognition through various media; visual product design is one of them. A distinctive, aesthetically appealing design can certainly attract customers' attention. However, when companies aim to attain recognition through visual product design, they generally seek to develop a strong design language that ties some, or all, of the company's products together in a visually coherent manner. This is a strategic decision made with the purpose of achieving a broader recognition of the brand as a whole, referred to as brand recognition. The goal of every brand-oriented organization is to have a strong identity. In order to achieve a strong brand identity, recognition of the brand is highly desired.

Complementarily to incorporating visual consistency, companies can strategically employ visual product design to communicate core brand values through their products' appearance. Different forms, materials, textures, etc., evoke different qualities and meanings in customers' minds. An important task for the company and designer is to identify and utilize design features that communicate the desired message to current and potential target consumers. As such, visual product design becomes an effective communication channel for the brand (Karjalainen, 2006), and
has been put forward as an essential strategic tool for companies to consider as they seek to achieve a strong brand identity (Schmitt & Simonson, 1997; Stompff, 2003).

“In addition to meeting our practical needs, products are also used for social and personal purposes. Products function as vehicles for communication and self-expression while revealing the user's identity to the external world and arousing personal pleasure.” (Karjalainen, 2006)

The level of brand impact may fluctuate depending on market segment and cultural differences. However, if the market segment of interest is narrowed down to consumer products for the commercial market, it is challenging to identify products that are not connected to some sort of branding association. Nevertheless, the truly successful are the ones that manage to combine the tangible product performance and technical excellence with the intangible brand associations.

Frameworks and methodologies that practically support designers as they approach a visual design task are very limited. An explanation proposed by Warell and Nåbo (2002) may be the fact that appreciation of visual design is dependent on subjective factors linked to individuals’ expectations, taste, and attitudes (Tjalve, 1979). Decisions related to such factors rely heavily on the skill and experience of the industrial designer. Traditionally, this type of “know-how” is considered uncapturable and indescribable (Warell & Nåbo, 2002).

The methodology developed by Tjalve (1979) remains one of the few practical tools available to industrial designers. Tjalve demonstrates a procedure for identification of potential product structures, total form, and form elements. The process is built around variation of five product properties: structure, form, material, dimension, and surface. The focus is mainly on operation, space, and technical functionality, while less emphasis is put on semantics or aesthetic criteria. The work of Warell and Nåbo (2002) is another exception. The authors propose a set of tools based on design syntactics: “design functionality analysis”, “form development”, and “design format handling”. Design format handling is a practical method for the identification of visual brand-specific characteristics. The method does, however, tend to become more of an analysis and evaluation tool, due to its time-consuming and directed nature. Implementation of basic design guidelines is a more common routine applied by companies to describe and communicate identity, sometimes referred to as “design philosophies”, “identity guidelines”, or “design formats”. Warell and Nåbo (2002) state that policies and vision declarations of such character have limited ability to express design directions that can be translated to industrial design specifications in a meaningful way. As a result, they are not well suited for practical
design work. Statements of this nature are further justified, since Karjalainen (2006) reveals that it can take up to two years for new designers at Nokia and Volvo to grasp what constitutes a viable design.

1.2 Study objective

The main objective of this study is to investigate how industrial designers may in practice transfer an already established visual design language to new products. This is an important task for designers to master in today's competitive market environment. By transferring an established visual design language to new product introductions, a company can utilize its existing brand identity and recognition. Furthermore, introducing additional products with a similar design language will strengthen brand recognition since individuals will come across the brand and its appearance in new market segments - the brand will be more visible.

The goal is to derive and investigate a structured framework, grounded in existing branding and visual design research, which can help industrial designers to more successfully extend a brand's design language to a new product. Measurements of effectiveness in this scenario are derived from established branding research. The starting point is a company brand with an established visual design language that is considered “up to date”. When a company introduces a product in a new product segment under an existing brand, it is referred to as a “brand extension”; this term will be used throughout this thesis. Since there is no, to the author’s knowledge, established and agreed upon practical framework applicable to this subject, a secondary goal is to investigate how designers in the field today would approach a product extension task.

The aim is to formalize a framework that is transparent and adaptable to various categories of consumer goods, something that both experienced and inexperienced designers can apply with confidence. Design is supposed to be a creative process; hence, it is crucial that the framework leaves room for the designers’ creativity to flourish.

1.3 Purpose

The purpose of this empirical study is to add knowledge to the field of visual design methodology, and to encourage further exploration in the area. A framework with the characteristics described in the above section would have the ability to support newly employed in-house designers as well as designers at design firms working
with different clients. In addition, the framework could potentially have educational applications, serving as a tool to develop design students’ ability to think about visual design in a strategic yet creative manner.

1.3.1 Question formulation

With regard to the purpose presented above, this thesis strives to answer the following questions:

1. How do designers approach a brand extension task?
2. Can a structured framework, based on established branding and visual design research, help designers create more successful brand extensions?
3. Can a structured framework of this type limit designers’ creative abilities?

1.4 Limitations

The study concerns physical, mass-produced products in the commercial marketplace, where visual design is a key attribute affecting the artifact’s appearance. An industrial designer is in this scenario generally responsible for the development of the product’s visual appearance. Parts of the proposed framework may have applications in other fields of design, such as graphic design and multimedia. However, such applications are not explored in this thesis.

As mentioned in Section 1.2, the starting point of this framework is a company with a visual design language with which it is satisfied. In some cases companies may want to revitalize their visual design language, re-design an existing product, or develop a completely new visual design language. Such strategic decisions and tasks are not the focus of this study. The framework is specifically aimed at brands with an existing visual design language that is considered up to date; the company’s objective is to extend its brand with a new product. The company’s goal is to strengthen its brand identity by applying its existing visual design language to a new product in a strategic manner.

Strategic decisions on visual product design are generally linked to differentiation and similarity on three dimensions. These dimensions are the company’s existing products, the company’s former products (heritage), and competing products (Momö, 1997; Warell, 2001). The author acknowledges that there can be value in considering the visual appearance of past product generations. This is however mainly applicable when a company aims to re-design an existing product or to
revitalize its visual design language as a whole. The framework therefore does not take past products into consideration.

"Mimicking" is another interesting, yet invasive, design strategy related to brand recognition. Typically, companies aim for similarity among their products and product generations, in combination with aesthetic differentiation from the competing products on the market. However, despite legal consideration, a company may try to mimic another successful company's design language (Person, Schoormans, Snelders, & Karjalainen, 2008). As a result, the product might catch customers' attention, perhaps leading them to purchase the product, either believing that it is from a competing company (Miaoulis & D'Amato, 1978), or believing that it has similar qualities as the product from the pioneering company (Kapferer, 1995). Since this thesis focuses on companies with an established visual design language of their own, this strategy is not considered.

1.5 Study approach and overview of adopted theory

This section provides a brief overview of the study approach and the adopted theoretical reference frame.

The proposed framework is founded on established branding theory. The central parts of the framework are derived through a holistic investigation of the basic concept of branding. The investigation starts with the very basic notion of branding, continues with an exploration of concepts such as brand architecture and brand hierarchy, and finally arrives at the concept of brand equity. To ensure that the framework is applicable from a practical standpoint, theories related to introduction of new products and strategic visual product design are explored. Central parts of the investigation include new products and brand extensions, design for recognition and association, and communication theory in product design.

Works by Kevin Lane Keller and David A. Aaker form the foundation of the theoretical basis related to branding concepts. These authors may be regarded as some of the most influential in the field of marketing and branding. They have both authored multiple books and articles that have been cited tens of thousands of times. On theory related to branding considerations and methodology in visual design, works by Anders Warell and Toni-Matti Karjalainen constitute the foundation. The author of this thesis views them as some of the most influential contributors in the field, and their works are cited multiple times throughout this thesis.
1.6 Practical process of the study

The practical process consisted of the following sequential steps (see Figure 1).

![Figure 1: The practical process](image)

1.7 Thesis outline

The thesis is divided into six chapters. Following the introductory chapter, Chapter 2 presents the theoretical basis of the thesis. The chapter provides information on central branding concepts, new product introductions, and topics related to visual product design that have directly influenced the development of the framework. Finally, Section 2.6 contains information on visual design analysis approaches and statistical data analysis methods applied during the experiment evaluation process.

The intent of Chapter 3 is to describe the proposed framework in detail. Decisions on practical steps and the structure of the framework are motivated by the theories presented in Chapter 2, Sections 2.1-2.5.

In Chapter 4, an experiment designed for evaluation of the framework is presented and motivations behind design decisions are provided. 10 practicing industrial designers participated in the experiment. The participants were asked to create two product drafts, one using their intuition or own process, and the second using the proposed framework.

The experiment evaluation procedures are presented in Chapter 5. First, a preliminary expert evaluation is described and justified. Second, a visual design analysis is exhibited and a process for identifying design features is explained. With insights from these two evaluation methods, a refined second expert evaluation is described and motivations are provided. The focus in this chapter is on the second expert evaluation, since it is viewed as the final, most sensible and reliable assessment of the experiment.
Chapter 6 presents the results of the study. Results from the statistical analysis of Expert Evaluation 1, the visual design analysis, and Expert Evaluation 2 are presented. Expert Evaluation 2 is analyzed in greater depth since it is considered more reliable. Results from an evaluation of designers’ ability to identify design features and storytelling factors are provided. In addition, an assessment of designers’ own approaches to the task is presented, and designers’ attitudes towards the proposed framework are examined.

Finally, in Chapter 7 each research question is discussed based on the results demonstrated in Chapter 6, and conclusions are drawn. In addition, the framework, experiment methodology, and designers’ attitudes are expanded upon. Lastly, the possibilities for future work are addressed.
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Chapter 2

Theoretical basis

2.1 Branding

The American Marketing Association defines a brand as a "name, term, design, symbol, or any other feature that identifies one seller’s goods or services as distinct from those of other sellers" (AMA). According to this definition, when someone creates an identifying feature, that person or organization has created a brand. However, to managers the meaning of a brand usually implies more than a single feature. An alternative definition is that a brand is something (tangible or intangible) that creates “awareness, reputation, prominence and so on in the marketplace” (Keller, Apélia, & Georgson, 2012).

Furthermore, brands can add value to both the brand owner, i.e. the company, and the customer. Brands help customers to identify specific companies. Customers learn about brands over time, through past product experiences and marketing campaigns. Ultimately, brands help customers to identify the companies that fulfill their expectations, and as a result simplify decision-making in the marketplace. Because brands take on a personal meaning and create unique customer experiences, they can provoke feelings and enrich customers’ everyday lives (Keller et al., 2012).

For companies, brands are an invaluable differentiation tool for attracting customers. Due to personal attachment, brands evoke customer loyalty, which creates bias for a specific company’s products and therefore increase sales and/or allows for premium pricing. Design and manufacturing processes can often be replicated to some extent. However, deeply rooted impressions in customers’ minds as a result of consistent product experiences and marketing are difficult to
reproduce. Tangible assets for a fast-growing consumer goods company can today represent as little as 10 percent of the total company value, while brands in some cases make up for 70 percent of a company's intangible assets (see Figure 2). Furthermore, brands provide structure to companies, which allows for easier product tracing and market targeting (De Chernatony, 1989; Keller et al., 2012).

Figure 2: Chart indicating distribution of tangible and intangible assets and goodwill for a few major brands (reproduced from Keller et al., 2012)

### 2.1.1 Brand architecture

The term brand architecture signifies the process of describing branding strategies on a structural level. Brands have to decide how to group products and select which branding elements/characteristics to apply to their different products. A company's brand architecture is decided with the objective of generating brand equity by clarification of brand awareness and motivation of brand image (Keller et al., 2012). There are four basic strategies for brand organization: (1) house of brands, (2) branded house, (3) master brand accompanied by endorsement brands, and (4) master brand accompanied by sub-brands (Aaker, 2004; Aaker & Joachimsthaler, 2009).

A house of brands strategy signifies a collection of independent brands controlled by one master brand (e.g. Procter & Gambler). When a branded house strategy is
employed, one master brand is applied to all products. In this case, the master brand is called an umbrella brand or family brand (e.g. Toshiba). Endorsement brands are independent to a certain extent, although linked to a master brand (e.g. Post-it by 3M). Sub-brands are also somewhat independent, except that they have a stronger connection to the master brand (e.g. Lenovo ThinkPad) (Aaker, 2004).

It should be noted that the vast majority of organizations applies some type of combination of the four branding strategies mentioned above. Each strategy and combination of strategies has its advantages and disadvantages (Aaker, 2004); however, they are outside the scope of this thesis.

### 2.1.2 Brand hierarchy

A brand hierarchy is a summarization of the brand architecture. Its purpose is to present the number and characteristics of reoccurring attributes incorporated throughout a company’s brands and products, in a structural order (Keller et al., 2012). Having a clear and logical structure for each level in the brand hierarchy helps both customers and the organization to navigate among the articles. The structure appears logical when each level represents the same characteristics respectively (Aaker, 2004).

Companies usually organize their products in product categories and lines, which may represent a certain level in the brand hierarchy. A set of potential levels in a brand hierarchy can be derived from Aaker (2004) (see Table 1). Aaker originally starts from level three; however, corporate brand and an application grouping have been added here to provide a holistic example. Potential hierarchy levels are corporate brands, brand and product groupings, umbrella brands, endorsement brands, individual brands, and modifiers. Products and brands are grouped and branded based on many different characteristic variables. Such variables may for example include benefits, applications, technologies, distribution channels, design, product types, and quality. Some companies choose to create brand names for each level, while others tend to use descriptors. One example of a descriptor is “Toothbrushes” in Table 1.
Table 1: Brand hierarchy levels exemplified by Colgate-Palmolive

<table>
<thead>
<tr>
<th>Level</th>
<th>Brand type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Corporate brand (or Company brand)</td>
<td>Colgate-Palmolive</td>
</tr>
<tr>
<td>2</td>
<td>Applications grouping (or Market segments)</td>
<td>Oral Care</td>
</tr>
<tr>
<td>3</td>
<td>Umbrella brand (or Family brand)</td>
<td>Colgate</td>
</tr>
<tr>
<td>4</td>
<td>Product type grouping (or Product categories)</td>
<td>Toothbrushes</td>
</tr>
<tr>
<td>4</td>
<td>Product function grouping (or Product lines)</td>
<td>Battery powered</td>
</tr>
<tr>
<td>6</td>
<td>Individual brand</td>
<td>Colgate ActiBrush</td>
</tr>
<tr>
<td>7</td>
<td>Modifier</td>
<td>Colgate ActiBrush Bzzz</td>
</tr>
</tbody>
</table>

A brand hierarchy tree for big house-of-brand organizations such as Colgate-Palmolive would be very large; it would essentially result in a “forest”. Colgate-Palmolive has 11 different brands today, and each brand holds a significant amount of products. When considering companies of this size, it makes sense to create separate trees for each brand or market segment (Aaker, 2004). Brand hierarchies for smaller companies, however, can be fully visualized in one tree (Keller et al., 2012). A brand hierarchy of the umbrella brand Colgate, targeting the battery powered toothbrush product line, is presented in Figure 3.

Figure 3: Brand hierarchy tree (reproduced from Aaker, 2004)
2.2 Brand equity

Keller et al. (2012) defines brand equity as “the differential effect that brand knowledge has on consumer response to the marketing of that brand”. When a brand has positive brand equity, consumers perceive a product and its marketing material as more appealing once the brand has been identified, compared to when it is unknown. As a result, consumers tend to be less concerned with price increases, more open to brand extensions, and more willing to connect with the brand via new channels. If a brand possesses negative brand equity, on the other hand, consumers find unnamed or fictitious versions of a product more appealing. According to its definition, brand equity is based on three components: brand knowledge, differential effect, and consumer response to marketing. However, the essential source of brand equity generation is said to be brand knowledge, since it enlightens consumers about differences and draws interest to the brand. Brand knowledge itself consists of two components: brand awareness and brand image (Keller et al., 2012).

2.2.1 Brand awareness

Brand awareness signifies consumers’ ability to identify a brand from memory under certain conditions; it can be divided in two categories: brand recognition and brand recall. Brand recognition represents customers’ ability to correctly identify the brand when given brand cues. In the market place this refers to how well consumers perceive a brand as something that they have seen before. On the other hand, brand recall represents consumers’ ability to from memory relate a brand to a product category (Keller et al., 2012).

2.2.2 Brand image

Brand image refers to consumers’ perceptions of a brand as reflected by associations to a brand in memory. Thus, for a brand to have a positive brand image, the brand has to communicate information that generates strong, favorable, and unique associations. Associations may be directly related to consumers’ product experience, but can also come from other product-independent sources. Marketing campaigns, word of mouth, and identification with a company, country, distribution channel, particular person, place, or event are all examples of product-independent sources (Keller et al., 2012).
2.2.3 Creating brand equity

As mentioned above, the key to positive brand equity is brand knowledge. Brand knowledge is established though brand awareness and brand image. Hence the question becomes: how are positive brand awareness and prominent brand image generated? A widely adopted approach is the Customer-Based Brand Equity (CBBE) model, first introduced by Kevin Lane Keller. CBBE consists of four steps, all connected to a certain task, customer question, and branding step (see Table 2).

Keller emphasizes that these four steps have to be completed sequentially. Hence a brand has to establish an identity before it can achieve a brand meaning in consumers’ minds; brand meaning fosters consumer response, and ultimately a consumer relationship can be accomplished.

Table 2: The four steps of CBBE (reproduced from Keller et al., 2012)

<table>
<thead>
<tr>
<th>Step</th>
<th>Branding task</th>
<th>Question asked by the customer</th>
<th>Corresponding brand step</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Identify the brand with customers and associate the brand in customers’ minds with a specific product class or customer need.</td>
<td>Who are you?</td>
<td>Brand identity</td>
</tr>
<tr>
<td>2</td>
<td>Establish the totality of brand meaning in the minds of customers by strategically linking a host of tangible and intangible brand associations with certain properties.</td>
<td>What are you?</td>
<td>Brand meaning</td>
</tr>
<tr>
<td>3</td>
<td>Elicit the proper customer responses to this brand identification and brand meaning.</td>
<td>What about you?</td>
<td>Brand response</td>
</tr>
<tr>
<td>4</td>
<td>Convert brand response to create an intense, active loyalty relationship between customers and the brand.</td>
<td>What about you and me?</td>
<td>Brand relationship</td>
</tr>
</tbody>
</table>

This process is illustrated as a pyramid consisting of six building blocks (see Figure 4). Brand meaning can be categorized into two groups: performance and imagery. The same holds for brand response, which can be divided into judgments and feelings. Brand equity is created when the blocks are assembled and the pinnacle is reached. As the pyramid shape suggests, brand equity can only be created when the blocks are assembled in the right order, starting from the bottom (Keller et al., 2012). The nature of this thesis suggests that brand meaning, i.e. performance and imagery, is subject to further examination.
Brand performance

The products themselves are central to customers’ experience with the brand. Brand performance refers to how well a brand’s products fulfill customers’ needs from a functional, aesthetic, and economical standpoint. Performance attributes may vary depending on product type and category. However, there are five types of attributes that generally apply: (1) primary ingredients and supplementary features, (2) product reliability, (3) service effectiveness, efficiency, and empathy, (4) style and design, and (5) price.

Brand imagery

Products have the ability to connect with customers on a psychological and social level. Brand imagery refers to how well a brand’s products fulfill consumers’ intangible needs. As mentioned in Section 2.2.2, associations can be generated from customers’ product experiences, but also through other product-independent sources. Four commonly applicable attributes connected to brand imagery are: (1) user profiles, (2) purchase and usage situation, (3) personality and values, and (4) history, heritage, and experience (Keller et al., 2012).
2.2.4 Competitive frame of reference

In order to generate desired brand knowledge, it is necessary to define the brand’s competitive frame of reference. Before applying the customer-based brand equity model addressed in Section 2.2.3, it is crucial to define the brand positioning, since it will help to decide on the specific characteristics of each block in the pyramid model. Thus, the competitive frame of reference will have an impact on the decisions related to desired performance and imagery.

Consumers perceive a brand differently depending on its position with regard to competitors. The objective is to position the brand so that it enlightens core values, unique aspects, and aspects that may be shared with other brands. Therefore, it is important to have a clear frame of reference, i.e. an understanding of how consumers behave and what they take into consideration when making their choice of brand and product. To determine the competitive frame of reference, it is necessary to identify the target market and the nature of the competition (Keller et al., 2012).

2.2.5 Target market

A market is a set of potential customers, who have the motivation, access, and financial opportunity to buy a specific product. Thus, depending on the target market, these factors are likely to differ. Without understanding the target market, it is impossible to know what consumers look for in a brand (Keller et al., 2012). A few commonly used market segmentation bases for determining a target market are provided in Table 3.

| Table 3: Market segmentation attributes (reproduced from Keller et al., 2012) |
|-------------------------------------|-----------------|-----------------|-----------------|
| Behavioral                         | Demographic     | Psychographic   | Geographic      |
| User status                        | Income          | Values, opinions & attitudes | International |
| User rate                          | Age             | Activates & lifestyle | Regional       |
| User occasion                      | Sex             |                  |                 |
| Brand loyalty                      | Family          |                  |                 |
| Benefits sought                    |                 |                  |                 |
| Sensory preferences                |                 |                  |                 |
2.2.6 Nature of the competition

It is vital to have a clear understanding of the nature of the competition. Studying competing brands and their products assists designers, strategists, and marketers to decide on which common elements to incorporate in order to help the customers navigate the offerings on the market. In addition, it provides guidance as to how the brand can differentiate itself from the competition (Warell, 2001).

However, depending on product type, it is sometimes hard to distinguish the nature of the competition and the target market for a brand or product, since the target consumers might already be looking at similar brands, which can implicitly indicate the nature of the competition (Keller et al., 2012).

2.3 New products and brand extensions

For a company to achieve long-standing success, new product releases are essential. When a company wants to introduce a new product, it has three different branding strategies to choose from: (1) introducing a completely new brand, specific to the new product, (2) applying an already existing brand, or (3) creating a so-called sub-brand by combining a new brand with an existing brand. The second and third alternatives are both considered brand extensions. Brand extension is defined as “when a firm uses an established brand to introduce a new product” (Keller & Aaker, 1992; Keller et al., 2012).

2.3.1 Applying an existing brand

Farquhar (1989) classifies brand extension of this type in two groups: category extensions and line extensions. “Category extension” is when a brand introduces a new product outside of its previously existing product categories. For example, if B&O Play were to introduce a camera it would be considered a brand category extension, since B&O Play does not currently market a product in that category. “Line extension” is when a company introduces a product that fits into an existing product line within the brand. For example, if Dyson were to introduce a robotic vacuum cleaner to its existing vacuum cleaner line, it would be considered a product line extension.

Another concept for brand extension categorization is based on horizontal and vertical brand extensions. This concept provides a way to distinguish between when an existing brand extends within its current market position, and when it changes positioning upward and downward, in terms of price and quality. “Horizontal
extension" is when an established brand introduces a new product that is either related to an existing product category or creates a new category on its own (Pitta & Katsanis, 1995; Doust & Esfahlan, 2012). Hence, a horizontal extension can be either a category or line extension, but market position is kept the same. "Vertical extension" is instead when an established brand introduces a new product associated with an existing product category or line, but in a different market position. "Upward vertical extension" signifies higher quality and price, while "downward vertical extension" signifies lower quality and price (Aaker, 1997; He & Li, 2010). In this case, a brand generates two products from one by creating a professional, luxury or low-cost version of an existing product (Andersson & Warell, 2015).

2.3.2 Creating a sub-brand
This branding strategy is utilized when a brand seeks to shift target market and/or market position. Therefore, the horizontal and vertical extension concepts can be applied to this strategy as well. Sub-brands are introduced with the intention that they will benefit from the awareness brought by the existing brand, also referred to as a "mother brand". This has to be done carefully in order to not damage the mother brand, especially when considering downward vertical extensions (Aaker, 1997; Keller et al., 2012). For example, B&O PLAY can be considered a sub-brand to Bang & Olufsen. Furthermore, since B&O PLAY products have a lower price point and different target market (B&O a), it can be considered a downward vertical brand extension.

2.3.3 Advantages and disadvantages
Keller et al. (2012) state that for most companies “the question is not whether a brand should be extended, but when, where and how”. There are generally two advantages associated with brand extensions: aid of new product acceptance, and new feedback to the brand. Although brand extensions are common practice today, brands should still plan extensions thoughtfully and be aware that there are a few disadvantages associated with the act. Table 4 provides a compilation of advantages and disadvantages associated with brand extensions.
Table 4: Advantages and disadvantages related to brand extensions
(reproduced from Keller et al. 2012)

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitate new product acceptance:</td>
<td>Confuse or frustrate consumers</td>
</tr>
<tr>
<td>Improve image</td>
<td>Encounter retailer resistance</td>
</tr>
<tr>
<td>Reduce risk perceived by customers</td>
<td>Hurt brand image</td>
</tr>
<tr>
<td>Avoid cost of developing new brand</td>
<td>Dilute brand meaning</td>
</tr>
<tr>
<td>Permit consumers to seek variety</td>
<td>Diminish brand identification with a certain product category</td>
</tr>
<tr>
<td>Provide new feedback to the company:</td>
<td></td>
</tr>
<tr>
<td>Clarify brand meaning</td>
<td></td>
</tr>
<tr>
<td>Enhance parent brand image</td>
<td></td>
</tr>
<tr>
<td>Attract new customer segments</td>
<td></td>
</tr>
<tr>
<td>Revitalize the brand</td>
<td></td>
</tr>
<tr>
<td>Permit subsequent extensions</td>
<td></td>
</tr>
</tbody>
</table>

2.4 Design for recognition and association

According to the CBBE model, the branding objective for developing brand meaning is to decide on points of difference (PODs) and points of parity (POPs) related to performance and brand image (Keller et al., 2012). The POD and POP concepts share several characteristics with the Most Accepted Yet Advanced (MAYA) concept developed by famous industrial designer Raymond Loewy in 1951. Both concepts suggest that when designing for a specific commercial brand, designers have to consider features that make the design appear unique and familiar at the same time (Loewy, 1951; Lidwell, Holden, & Butler, 2010; Andersson, Warell, & Holmlid, 2013).

Furthermore, a study based on interviews with senior managers and consultants working with strategic design indicated that the most common strategic design decision involved differentiation or similarity considerations. The interviewees felt a need to express both product portfolio attachment and indicate product category affiliation (Person, Snelders, Karjalainen, & Schoormans, 2007). Hence, the POD and POP can be seen as key concepts when considering brand extensions.

2.4.1 POD

PODs are "strong, favorable and unique associations" linked to a specific brand and its products. These associations may be derived from any attribute or branding element. It is crucial, however, that customers perceive POD associations as truly exclusive to the brand, since their purpose is to differentiate the brand from the
crowd. Keller et al. state that consumers often choose a brand based on uniqueness; thus it is important to create strong and favorable associations (Keller et al., 2012). By systematically applying defined design strategies over a longer period of time, brands can develop strong PODs, defined by the brand history and what some refer to as “brand DNA” (Warell, 2006; Karjalainen & Snelders, 2010; Kapferer, 2012; Andersson & Warell, 2015).

2.4.2 POP

POPs are associations shared with other brands and their products. There are two types of POPs: category POPs and competitive POPs. Category POPs are associations necessary for customers to consider a product to be a member of a certain product category. When introducing a brand extension, a solid understanding of which category POPs to include is crucial. Competitive POPs are associations extracted from competitors’ products. For example, if customers perceive one brand’s PODs as typical for a specific product category, another brand may incorporate similar associations as an attempt to “break even” (Keller et al., 2012).

2.4.3 Core brand associations

The core brand associations are a set of five to 10 attributes that capture the essence of the brand and what it represents. More specifically, they should reflect how consumers perceive the brand based on attributes such as beliefs, attitudes, opinions, feelings, images, and experiences. As a brand evolves and expands, these associations serve as a foundation for brand positioning and identification of PODs. Core brand associations are often categorized as top-of-mind associations, and can be identified by creating a simple mental map (Keller et al., 2012). Some may refer to core brand associations as “storytelling factors” (Bennett, 2013). In terms of product design, core brand associations function as an indication of what semantic function the product should express (Monō, 1997).

2.4.4 Current product sign

The current product sign is a notion closely related to the category POP concept. Both concepts aim to define design features necessary for customers to recognize affiliation with a certain product category. However, the current product sign is a concept directly related to product design. It implies a more holistic view considering the product’s complete physical appearance. Design attributes to consider when identifying the current product sign are usually related to technological principles, and ergonomic and communicative functions. Attributes
may differ widely depending on the product (Monö, 1997; Ranscombe, Hicks, & Mullineux, 2012; Andersson et al., 2013). However, a few general attributes to consider are product components, product organization/structure, materials, texture, and ergonomic and communicative elements.

### 2.5 Communication through visual product design

Companies may use many different tools to communicate their core brand values to the consumers; product design is one of these tools (Karjalainen, 2006). In order for the communication to be successful, companies should utilize all tools in a coherent manner. In other words, all communication channels should be synchronized and aim to deliver a similar message (Aaker, 1996).

When product design is employed as a communication tool, company values are expressed via design features incorporated into the design of the product. These design features, together with the other communication tools, embody the brand's identity (Mooy & Robben, 2002).

#### 2.5.1 Design features

Design features, also referred to as design cues or design references, are specific elements of a product gestalt. For example, form elements, such as a specific curve, shape or pattern, can be considered design features (Mollerup, 1997; Karjalainen & Snelders, 2010; Andersson & Warell, 2015). In some cases, the characteristics of an overall appearance may be considered a feature. Harm Lagaay, accomplished car designer and former design director at Porsche, states that the characteristic Porsche shape is defined by "the combination of surface treatment, highlighting and tension, which to a large extent comes from the transition from convex and concave shapes". Lagaay infers that there is no single design feature, such as a radiator grill, that identifies a Porsche, but rather it is the overall design of details and surfaces (Weernink, 2001).

Design features can utilized in a strategic manner to create recognition through similarity, as a result of repetitive implementation over a product rage (Warell, 2001; Person et al., 2007). Furthermore, depending on characteristics (shape, color, texture, material, etc.) a design feature can communicate core brand values on its own. Hence, design features can be used as an embodiment of product and brand associations (Kreuzbauer & Malter, 2005; Karjalainen & Snelders, 2010). Consequently, when design features are employed thoughtfully, they have the
potential to become a central, well-recognized communicator of the brand's core values (Oppenheimer, 2005).

2.5.2 POD and POP features

Design features can be categorized by the POD and POP concepts addressed in Section 2.4. A visually distinct design feature can be incorporated into a design to differentiate a product from competing products; a feature of this type is categorized as a POD. Design features categorized as POP may be used to communicate affiliation to a specific product category. As such, they are features commonly employed throughout the product category, and are therefore shared with other brands. As a result, designers commonly use both POD and POP features to create products that demonstrate distinct brand affiliation while at the same time providing a product category indication (Keller et al., 2012; Andersson & Warell, 2015).

2.6 Analysis theory

The theory presented in this section covers concepts relevant to the analysis of the experimental evaluation conducted in this study.

2.6.1 Statistical analysis approaches

The Student's t-test is a commonly applied method used to determine the significance of the difference between means of two independent samples. In other words, it is a test of the null hypothesis that the means of two samples are equal. The Student's t-test compares differences between the mean value for a specific group and that of the whole population. Furthermore, the Student's t-test requires continuous data and assumes that the data are normally distributed. The Kruskal-Wallis test is another method applicable to comparison of two or more independent samples. It is a rank-based method that tests the null hypothesis that the samples come from the same location, i.e. same group. The Kruskal-Wallis test is non-parametric and thus does not assume that the data are normally distributed. Furthermore, the method is valid for small samples, the minimum limit being five (N=5). The Kruskal-Wallis test does, however, make the assumption that the distribution for each group has a similar shape (McDonald, 2014).

Bootstrapping, i.e. random sampling with replacement, is a useful approach when assumptions about the population cannot be made directly. The method is valid for
small samples, since it expands the data set by selecting new observations sampled from the experimental data, making it particularly useful when it is difficult to source more data. The only assumption made is that the sample is a good approximation of the population (Adèr, Mellenbergh, & Hand, 2008). To compare the performance of two groups, one may want compare the difference between the means of two experimental groups. For example, when comparing the performance of two groups of N people, scores from both groups can be selected to form a pool of 2N scores. From that pool, two new groups of N scores can be extracted with replacement allowed. Mean values of scores from both groups can then be calculated. The difference in means can then be computed, resulting in a data point. Repeating the same scheme multiple (e.g. 1000) times results in a distribution of data points. The computer-generated distribution has its own mean and standard deviation, and is normally distributed. Confidence intervals can then be calculated. The difference between the experimental and the control means can be compared with the computer-generated distribution. The experimental difference is determined to be statistically significant if it is outside the confidence interval. Usually a 95% confidence interval is applied.

**Paired tests**

The paired sample t-test is a statistical technique that is commonly used to compare two population means when the observations are paired. The test is frequently used in scenarios such as “before-after” and “case-control” studies. It tests the null hypothesis that the mean difference between paired observations is zero. The test requires continuous data, and assumes that the data is normally distributed. The Wilcoxon signed-rank test is another method applicable to comparison of paired samples. It can be considered the non-parametric equivalent to the paired t-test. Since the Wilcoxon signed-rank test is non-parametric, it does not assume that the data are normally distributed. It is a rank-based method that tests the null hypothesis that the median difference between paired measurements is zero, i.e. that the number of differences in each direction are equal. Furthermore, the method is frequently applied for small samples. (McDonald, 2014).

**Fisher’s exact test**

The Fisher’s exact test can be used to examine the significance of the contingency between two classifications, for example between “before-after” scenarios. The method is for example useful when the assumptions that two samples line up cannot be steadily proved. Moreover, when members of two independent groups can fall into one of two mutually exclusive classifications, e.g. a “high ranked group” and a
"low ranked group", a two by two contingency table may be created (see Table 5). The Fisher's exact test is used to determine whether the proportions of those falling into each classification differ by group. Hence, the null hypothesis is that there is no association between the relative proportions of the two variables (McDonald, 2014).

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>High ranked group</th>
<th>Low ranked group</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>a</td>
<td>b</td>
<td>a+b</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>c</td>
<td>d</td>
<td>c+d</td>
</tr>
<tr>
<td>Column Total</td>
<td>a+c</td>
<td>b+d</td>
<td>a+b+c+d (=n)</td>
</tr>
</tbody>
</table>

Furthermore, the probability of observing a given set of frequencies a, b, c, and d in a two by two contingency table, with fixed row and column totals and sample size n, can be calculated using Equation (1). The equation below gives the one-tailed Fisher p-value and exemplifies the concept; however, usually a two-tailed p-value is recommended, unless it can be justified that one scenario simply cannot be “worse” than the other.

\[
p = \frac{(a+b)(c+d)}{a!b!c!d!} \leq \frac{(a+b)! (c+d)! (a+c)! (b+d)!}{n!}
\]

### 2.6.2 Inter-rater reliability

Consider an event where multiple individuals, here referred to as raters, are asked to independently evaluate a subject or an object based on a specific criterion. Raters may for example evaluate a subject or an object by assigning values with nominal or ordinal characteristics. Inter-rater reliability is a measurement of the extent of the agreement among raters; it indicates whether the differences among raters' assigned values are comparable with the differences among randomly assigned values. As such, it provides information on whether the data are to a large extent affected by the raters instead of by the subjects or objects that are being evaluated (Gwet, 2014).

There are many types of statistical approaches to inter-rater reliability for different types of measurements. Krippendorff’s alpha is considered to be one of the more versatile approaches, applicable on numerous distance metrics including: nominal,
ordinal, interval, and ratio labels (van Rysewyk & Pontier, 2014). Furthermore, it is valid for small sample sizes, and when two or more raters have been utilized. A Krippendorff's alpha of 1 signifies perfect reliability, while an alpha of 0.67 typically can be considered satisfactory. Although, some researchers have accepted slightly lower alpha values as satisfactory or sufficient (Poetz & Schreier, 2012; Antoine, Villaneau, & Lefeuvre, 2014). Krippendorff's alpha can for example be calculated in the analytics software IBM SPSS using a macro, or in MATLAB using a verified function (Eggink, 2012).

2.6.3 Visual design analysis of a product portfolio

Warell and Nåbo (2002) propose a method for capturing product styling for strategic design management using design “format modeling”. The model evaluates each product in a brand’s product portfolio based on a number of commonly applied design features. In other words, the method seeks to identify the correlation between a brand’s product portfolio and the brand’s POD features. Figure 5 illustrates the method applied Bang & Olufsen’s then-existing products and commonly applied design features. The method includes four steps:

1. For each product included in the product rage to be explored, significant design features are identified. This can be done by dissecting the form of the products in the product portfolio. Styling features are analyzed on a “macro” level. The objective is to identify features that are typical for the product portfolio as a whole. In the case of Bang & Olufsen in 2001, common design features include geometrical forms, connected volumes, metal finishes, and black surfaces, etc.
2. The identified design features are noted in the top row of the chart.
3. Each product is evaluated on the level of presence of all noted design features. Filled dots indicate a strong correlation between product and design (two points), and circles indicate a weaker correlation (one point).
4. The values are summed up and score counts are presented in the right and bottom chart margins.

The weighted frequency of occurrence of each visual design feature is indicated in the bottom margin of the chart. In the Bang & Olufsen case from 2001, geometrical forms and black surfaces are examples of features highly represented throughout the product portfolio. Features such as glass surfaces and grill-like raster were less represented. However, such features can still be perceived as significant to the
brand's visual brand identity if applied consistently over a couple of products in the brand's portfolio. Numbers in the right margin indicate the level of occurrence of styling features in each product. Products receiving high scores are typical to the brand's styling scheme and can be referred to as "strong" products, while products receiving low scores are less characteristic to the product portfolio's visual design language (Warell & Nåbo, 2002).

Figure 5: Visual design analysis performed on Bang & Olufsen's product portfolio in 2001 (Warell & Nåbo 2002)
2.6.4 Identifying design features in a product

In order to analyze the visual design characteristics of a single product, the form of the product must be deconstructed into "visual ingredients". Depending on design features and product structure, the deconstruction may vary between cases (Warell & Nåbo, 2002).

A method for identifying and elucidating design features is presented in Figure 6. Design features are selected based on a prior study of the visual design language. Normally, the most significant design elements, i.e. those ranked highest in the visual design language assessment, are selected (Warell, 2004).

Figure 6: Highlighted design features on a truck cabin exterior (Warell, 2004)
Chapter 3

Deriving a framework

A design framework for extending visual brands to new products was developed based on the theory presented in Chapter 2. The framework is largely based on the POD and POP concepts addressed in Section 2.4. Another essential part involves strategic consideration with regard to a brand hierarchy tree, covered in Section 2.1.2. The proposed framework is composed of three consecutive identification steps (see Figure 7).

<table>
<thead>
<tr>
<th>STEP 1</th>
<th>Identify current product sign, i.e. POPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP 2</td>
<td>Identify product location in brand hierarchy</td>
</tr>
<tr>
<td>STEP 3</td>
<td>Identify current design language, i.e. PODs</td>
</tr>
</tbody>
</table>

Figure 7: Identification steps to go through before starting to generate concepts

Prepared reference materials, collected by utilizing a specific background research procedure, accompany each identification step. The steps and material preparations are explained in detail below.

3.1 Step 1 – Identify current product sign

Identifying the current product sign is an essential step when considering brand extensions. The current product sign, or in other words, the category-related POP features that comprise the current product sign, are identified by analyzing existing products on the target market.
Products in different market segments may have different features and functions. Therefore, it is important to select reference products from the correct market segment. By utilizing search filters on retailer websites, product configurations and price ranges can be selected. To allow for a holistic overview and consistent analysis of the products, it is recommended to arrange a set of pictures of each product on a separate page or "art board".

Since the current product sign defines design features necessary for customers to affiliate a product with a certain product category, the analysis should focus on technological principles, and ergonomic and communicative functions. In order to facilitate consistent analysis over several products in a time-effective manner is it beneficial to use a set of standardized attributes as guidance. Attributes may differ widely depending on product. However, a few generic attributes to consider are listed in Table 6. In addition, this identification step functions as a holistic investigation of the nature of competition, addressed in Section 2.2.6.

### Table 6: Generic attributes related to identification of current product sign

<table>
<thead>
<tr>
<th>Current product sign attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product components</td>
</tr>
<tr>
<td>Product organization/structure</td>
</tr>
<tr>
<td>Materials</td>
</tr>
<tr>
<td>Textures</td>
</tr>
<tr>
<td>Ergonomic functions</td>
</tr>
<tr>
<td>Communicative functions</td>
</tr>
</tbody>
</table>

#### 3.2 Step 2 – Identify product location in brand hierarchy

As revealed in Section 2.1.2, design features and level of consistency can vary between a company’s brands (if multiple), product categories, and lines. Therefore, when considering a brand extension it is beneficial to have a good understanding of how the company’s visual identity is structured and how this structure might affect the extending product.

A brand hierarchy tree is a way to summarize the brand architecture by displaying a company’s brands, product categories, product lines, modifiers, etc., in different levels. The tree structure provides information about how blocks are related to each other. There is generally a certain level of consistency at each hierarchical level, which depending on strategy may or may not be related to visual appearance. The brand hierarchy tree is introduced with the intention of helping designers identify the brand’s visual strategy.
For example, Bosch Power Tools (see Figure 8) has strategically decided to target two different market segments by essentially creating two different sub-brands: Bosch DIY targets households, while Bosch Professional is aimed at trade and industry. Although there are a number of common characteristics between the two sub-brands, i.e. in terms of communicating central Bosch values, the individual design languages appear to evoke different feelings. Bosch DIY may be perceived as expressive and fun, while Bosch Professional tends towards a serious and tough look. Moving down one hierarchy level to consider Bosch Professional's product category of cordless tools, there are a few specific features connecting the products in that specific category. Two easily distinguishable examples might be black batteries with red detailing, and detailed rubber grips. Further down the hierarchy, Bosch Professional's cordless drill/drivers line is tied together by a number of specific design features, for example: similar formation and location of ventilation slots, rubber grip pattern, logotype location and framing, interaction points, and batteries that in addition to coloring also share the same general form.

It should be noted that some of these similarities may be a result of functional requirements, or driven by costs associated with manufacturing, etc. Nevertheless, similarities in features make for a consistent visual appearance. As such, depending on hierarchy level, designers may have to consider different design features. Extending Bosch Power Tools with a new product category would allow for more visual freedom, compared to an extension of Bosch Professional's cordless drill/drivers line.
For instance, suppose that Bosch Power Tools were to extend its Professional sub-brand with a cordless rotary buffer. Creating a brand hierarchy for Bosch Power Tools’ current offerings and indicating the brand extension would allow the designer to grasp the brand’s structure and investigate visual consistency at each level. Hence, designers could identify design features that are typical for the design language as a whole, as well as features that are specific to product categories, lines, modifiers, etc. By explicitly indicating brand hierarchy levels in the hierarchy tree, a brand’s structure becomes visually easy to grasp (see Figure 9).
3.3 Step 3 – Identify current visual design language

In order for a brand extension to be successful, it has to communicate brand affiliation. This is accomplished by incorporating design features specific to the brand (PODs) along with core brand associations. Together, these may be referred to as brand identity factors.

PODs are identified based on visual analysis of the brand’s existing products. Pictures of existing products can be sourced from the brand’s current official media. Just as in Step 1, it is recommended for designers to arrange a set of pictures of each product on one separate page or “art board”.

Again, to facilitate consistent analysis over several products in a time-effective manner it is beneficial to use a set of standardized attributes as guidance. Virtually any design element can become a POD; the only requirement is for them to be strong, favorable, and unique design features. However, a few generic attributes to consider are listed in Table 7.

<table>
<thead>
<tr>
<th>Table 7: Attributes related to identification of visual brand identity factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brand identity factors: Visual design</strong></td>
</tr>
<tr>
<td>Form elements</td>
</tr>
<tr>
<td>Product architecture</td>
</tr>
<tr>
<td>Proportions</td>
</tr>
<tr>
<td>Lines</td>
</tr>
<tr>
<td>Textures</td>
</tr>
<tr>
<td>Color scheme</td>
</tr>
<tr>
<td>Materials</td>
</tr>
<tr>
<td>Graphics</td>
</tr>
</tbody>
</table>
Furthermore, brands are related to certain core brand associations, also referred to as “storytelling factors”. Core brand associations are a set of five to 10 attributes that capture the essence of the brand. More specifically, they should reflect how consumers perceive the brand as a whole. These core associations serve as a foundation for the identification of PODs as the brand expands. Potential attributes to consider are presented in Table 8. A brand catalog or official website should communicate core brand association. Therefore, it is suggested to use these media during the identification process.

### Table 8: Attributes related to identification of core brand associations

<table>
<thead>
<tr>
<th>Brand identity factors: Storytelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>General values</td>
</tr>
<tr>
<td>Mission</td>
</tr>
<tr>
<td>Image</td>
</tr>
<tr>
<td>Heritage</td>
</tr>
<tr>
<td>Quality</td>
</tr>
<tr>
<td>Niche</td>
</tr>
<tr>
<td>Context</td>
</tr>
<tr>
<td>Area of use</td>
</tr>
</tbody>
</table>

#### 3.4 Generating concepts

Designers are advised to take notes during the identification process. Then once all steps are completed, a “bank” of design features related to the specific case has been created. Upon completion of the identification steps, concept generation begins.

The purpose of the sequential structure and inclusion of generic attributes is to provide designers with a point of departure, which may foster a thought process in terms of “product signs” (POPs) and “visual design languages” (PODs). The brand hierarchy tree provides strategic guidance on the selection of design features; however, ultimately the designer decides which POPs and PODs he or she wants to incorporate. Consequently, the framework may bring structure and guidance to the design process and generate a valid frame of reference, while at the same time leaving room for designers’ creativity.
Chapter 4

Experimental evaluation

In order to evaluate the framework and gain further insight into how designers approach a brand extension task, an experiment and observational study were designed and conducted with the participation of industrial designers.

To present the industrial designers with a well-defined task and allow for consequential evaluation, three general assumptions were made.

- Case brands are satisfied with current visual design language.
- Strategists at the companies have identified a target market segment and decided that the proposed brand extension is lucrative.
- Existing products in the market segment of interest reflect the principal functional requirements.

4.1 Experimental design

To evaluate the proposed design framework, an experimental study was devised. The experiment consisted of two brand extension cases. The framework was applied on one case, while the other functioned as a “control” case.
4.1.1 Experimental outline

Participating designers were asked to create design drafts for two different brands. Each product was considered a brand extension. The objective was to design products that would fit with the brand’s existing design language. The participants were asked to create their design draft by sketching products on paper and providing descriptive notes as they saw fit. In addition, participants were asked to identify visual brand elements and storytelling factors that they perceived as central to the brand.

Furthermore, the experiment consisted of two scenarios, through which all participating designers cycled:
Scenario (I): Designers imagined, i.e. used intuition or their own method; and
Scenario (II): Designers were asked to follow the proposed framework.

Since all participants cycled through both scenarios, two brand extension cases were created. Case (A) sought to extend the brand B&O PLAY with a compact digital camera. Case (B) sought to extend the brand Dyson with a robotic vacuum cleaner. To minimize secondary effects on the experiment, scenarios and cases were alternated among the participants. One half of the total number of participants was assigned case (A) in scenario (I), and consequently case (B) in scenario (II), while the other half was assigned case (B) in scenario (I), and case (A) in scenario (II).

Scenario (I) served two purposes. First, it functioned as a benchmark scenario, allowing for the evaluation of design drafts created during Scenario (II). Second, it served as an exploration of how industrial designers today would approach a brand extension task.

4.1.2 Case selection

Since all participants were asked to cycle through both scenarios, it was important to select cases with similar characteristics and complexity. Each case had two main components: a brand and a product. To add a feeling of reality to the task, the combination of brand and product was selected in such a way that it could be perceived as a probable case.
Brand selection

Selection of brands was based on three parameters: nature of design language, brand awareness among industrial designers, and complexity of branding strategy. Brands with distinctly different design languages were selected in order to ensure that the two were not confused and that they did not in some way affect each other's visually significant characteristics. However, brands with equally defined design languages and similar levels of brand awareness within the industrial design community were targeted.

Furthermore, brands with equally complex branding strategies were selected. Complexity was determined based on brands' internal structure of design language. As stated in Chapter 2, there are many different ways to structure a brand. Some brands choose a consistent design language throughout their whole product portfolio, while some differentiate design language between product categories and lines, and others choose to introduce a sub-brand with a slightly different design language. For this experiment, brands with two different design languages were targeted.

Product selection

Selection of products was based on two parameters: general product type and product maturity. To narrow down the scope, technical products were selected as the general product segment. In terms of industrial design, technical products generally allow for a certain level of freedom; there are often some types of casing design or interaction points to consider. Mature products generally have a well-defined product sign, which implies that companies apply the same technical concept. To ensure that POPs were equally difficult to determine, products with a similar level of product maturity were targeted.

4.2 Case descriptions

Based on the considerations addressed in Section 4.1.2, two cases were identified (see Table 9). A brief motivation for these selections is provided below, after which the two cases are investigated in more detail.

Table 9: Selected cases

<table>
<thead>
<tr>
<th>Case</th>
<th>Brand</th>
<th>Product for brand extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B&amp;O PLAY</td>
<td>Compact digital camera</td>
</tr>
<tr>
<td>B</td>
<td>Dyson</td>
<td>Robotic vacuum cleaner</td>
</tr>
</tbody>
</table>
Most people would agree that B&O PLAY and Dyson both have distinct visual design languages. However, the design languages themselves are visually very different from each other. The two brands have diverse branding strategies. Yet the strategies are similar in terms of complexity, since both can be related to two different internal visual design languages. Furthermore, the brand awareness among industrial designers is assumed to be high, since both are globally accessible and recognized for their product design through numerous design awards.

A digital camera and a robotic vacuum may both be considered technical products. In addition, both products can be seen as mature, meaning that they have an established product structure that virtually all manufacturers apply.

4.2.1 Case A – B&O PLAY

B&O PLAY, also stylized as “BeoPlay”, can be considered a vertical downward brand extension of Bang & Olufsen; hence B&O PLAY is a sub-brand to Bang & Olufsen (B&O a). Today B&O PLAY offers products in three product categories: audio, headphones, and television (B&O b).

Bang & Olufsen is a global provider of integrated audio-video solutions and services for the luxury market, while B&O PLAY is focused on stand-alone audio-video products that combine high-quality and contemporary design for the younger audience. B&O PLAY aims to offer portable products that are intuitive to use and deliver excellent high-quality experiences. Furthermore, B&O PLAY’s products have a lower price point compared to typical Bang & Olufsen products. B&O PLAY’s products differ from Bang & Olufsen’s since the products are designed to fit the usage pattern of the digital generation, with a contemporary and playful design (B&O a). Figure 10 below exemplifies the difference in the design languages. Bang & Olufsen and B&O PLAY have both been globally recognized for their design and have received multiple design awards (B&O d; B&O e).

“Marrying the values of PLAY with the substance, quality and luxury of Bang & Olufsen characterizes what we stand for: Bang & Olufsen + PLAY = B&O PLAY” (B&O c).
Brand extension

If B&O PLAY were to introduce a digital camera, the brand would be entering a new product category; hence it would be considered a product category extension. Moreover, B&O PLAY is a sub-brand to Bang & Olufsen, and both are controlled by the corporate brand Bang & Olufsen Group (B&O h). Thus, a brand hierarchy tree, indicating the proposed brand extension, would resemble the one illustrated in Figure 11.
To further define the case, a target market segment was specified. In this case the market segment was characterized by the following parameters: compact/point-and-shoot digital camera, standard configuration, and high-end segment ($250-400). Moreover, market research indicates that a compact digital camera can be considered a mature product, since nearly all companies apply a similar product structure (B&H Photo).

4.2.2 Case B – Dyson

Dyson is a global manufacturer and supplier of home appliances. The company is performance focused and is constantly striving to make things better by technology research and innovative design. Its products are often a combination of inventive engineering, passion for technology, and brave design (Dyson a).

Today Dyson offers vacuums, fans, and heaters aimed at the consumer market. Dyson has chosen to categorize these products into two product categories: "Vacuums" and "Fans and Heaters" (Dyson b). Figure 12 below exemplifies the difference in design language between the two product categories. Dyson has been globally recognized for its design and has received multiple design awards (Red Dot; Dyson d).

"We start with a problem. Something that frustrates or nags because it doesn't work properly. It could be any everyday object. Then we figure out how to make it work better." (Dyson c)

It is reasonable to believe that Dyson’s visual appearance is to some extent a result of a technical concept. However, it is obvious that the company employs visual consistency and conveys a design language in terms of form elements, coloring, finishes, etc., throughout its respective product categories. Furthermore, it should be mentioned that Sir James Dyson himself, at one point, stated in an interview that he does not believe in brands. However, branding researchers and strategists strongly believe that the company in fact applies a wide range of branding strategies. Some consider the statement to be a result of Dyson’s own interpretation.

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1 Dyson also offers hand dryers, designed for public spaces (business-to-business sales). Since the focus of this study is on consumer products, they were not considered. It should furthermore be recognized that Dyson is about to enter new product categories later this year, with products such as humidifiers and LED lamps. These products are however not released yet, and were thus not considered either (Dyson b). In addition, Dyson did in fact release a robotic vacuum for the Japanese market only in July 2015, and a limited number in July 2014 (Dyson e). These releases occurred after the development of the experiment in this study. However, none of the experiment participants located Dyson’s “360 Eye” vacuum while conducting the experiment. Participants were also asked afterwards if they were aware of its existence, and none expressed that they were.
of the word “brand” (Hanlon, 2012; Hollis, 2014; Creamer, 2014). Nevertheless, the company possesses clearly defined visual design languages within its product categories, and thus it makes a good case brand for this study.

![Figure 12](Image)

Figure 12: To the left, a desk fan from Dyson, “AM09” (Dyson b). To the right, an upright vacuum from Dyson, “Dyson Ball Compact Animal” (Dyson b).

**Brand extension**

If Dyson were to introduce a robotic vacuum, the brand would be adding a new product line; hence it would be considered a product line extension. Moreover, Dyson is a corporate umbrella brand overseeing all of its product categories. Dyson’s vacuum category includes four product lines: uprights, canisters, cordless, and handheld (Dyson b). Thus, a brand hierarchy tree indicating the proposed brand extension would resemble the one illustrated in Figure 13.

![Figure 13](Image)

Figure 13: Brand hierarchy tree including brand extension indication (Case B)
To further define the case, a target market segment was specified. In this case the market segment was characterized by the following parameters: robotic vacuum, domestic uses/household, high-end segment ($600-900).

It should be noted that the robotic vacuum is a more recent innovation compared to the digital camera. However, robotic vacuums can be found in virtually any consumer electronics store today. Furthermore, market research indicates that a robotic vacuum can be considered a mature product, since nearly all companies apply a similar product structure (MediaMarkt).

### 4.3 Participants

Since visual appearance was the main focus of this study, individuals with industrial design background were targeted. To allow for meaningful experimental evaluation, participants with similar skill levels had to be located. Educational background and industry experience were used as skill indicators during the recruitment processes. It was determined that participants should have a bachelor’s or master’s degree in industrial design or a closely related field, as well as some level of industry experience. Recruitment was done via email and telephone. A letter functioning as a transcript for recruitment can be found in Appendix A.

10 industrial designers participated in the experiment. Participants were located in cities across the United States, Italy, and Sweden. In-person meetings were organized whenever possible. Four out of 10 experiments were conducted by video call. Live video and screen sharing made the observation and instruction tasks nearly equivalent to in-person meetings.

### 4.4 Detailed experimental procedures

The experimental procedures can be divided into five parts, indicated in Figure 14.

Participants were introduced to the experiment when recruited (see Appendix A). Once a participant had consented to participate, meetings were arranged.

![Figure 14: Experiment procedures](image-url)
4.4.1 Background survey
Participants were asked to fill out a survey regarding their background. The survey comprised questions regarding participants' age, educational background, industry experience, specific branding experience, and familiarity with the two case brands. The survey provided information on demographical diversity among participants and included parameters that could potentially have secondary effects on the experiment.

4.4.2 Part 1
Participants were asked to use their intuition or own method to create a product draft for one of the two cases. Minimal instructions were provided during this "control" scenario. In accordance with initial assumptions, the task was to create a product draft for a brand that was satisfied with its current design language. Thus, participants were informed that it was "important for the brand that the product fits in to their existing visual brand identity". In addition, a target market segment for the case product was provided. Participants used a laptop to research the brand and market segment as they saw fit. Participants presented one final concept as a sketch or series of sketches on one Letter (or A4) sized paper. Inclusion of descriptive notes was encouraged to communicate features not explicitly represented in the sketch or sketches.

4.4.3 Reflection 1
Participants were asked to describe their design process. In addition, participants were asked if they had decided to incorporate any brand identity factors. If so, they were requested to more specifically describe which visual design elements they had decided to incorporate, and which mental brand elements (i.e. core brand associations or storytelling factors) they intended to convey. Lastly, participants were asked to explain how they decided on the overall shape and structure of the product.

4.4.4 Part 2
The second part involved the framework described in Chapter 3. Just as in Part 1, participants were informed that it was "important to the brand that the product fits in to their visual brand identity". Similarly to in Part 1, participants were provided with a target market segment for the case product.
As explained in Chapter 3, the proposed framework is based on three identification steps. In Step 1, “Identify current product sign”, participants were provided with a document prepared according to Section 3.1, including pictures of existing products in the target market segment. Participants were asked to view the document and identify design features that they found representative for a product in this segment. Furthermore, participants were offered a list of potential attributes to guide the identification process.

The framework’s second step is to “Identify product location in brand hierarchy”. In a real event, managers or brand strategists may complete or at the very least play a crucial role during a task of this nature. The framework suggests, however, that designers should be aware of the brand’s structure and the location of the product they intend to design. Therefore, designers were provided with a prepared brand hierarchy tree, indicating the location of the brand extension. The prepared brand hierarchy trees are presented in Section 4.2. As designers moved on to Step 3, “Identify current design language”, they were requested to think about how the brand hierarchy location of the product might affect the product design language.

In Step 3, participants were provided with a document, prepared according to Section 3.3, including pictures of the brand’s existing products. Participants were asked to view the document and identify visual brand identity factors they perceived as specific to the brand. Case A was considered a category extension, while Case B was viewed as a line extension. Participants were specifically asked to focus on factors they found common between all product categories/lines, rather than using one product as their single source of inspiration. In addition, participants were asked to identify storytelling factors related to the brand by reviewing a brand catalog. Participants were given a list of potential visual brand identity and storytelling attributes to consider.

Just as in Part 1, participants presented one final concept as a sketch or series of sketches, on one Letter (or A4) sized paper. Inclusion of descriptive notes was encouraged to communicate features not explicitly represented in the sketch or sketches.

4.4.5 Reflection 2
Participants were requested to describe which visual design elements they had decided to incorporate, and which mental brand elements (i.e. core brand associations or storytelling factors) they intended to convey. In addition,
participants were asked to share their thoughts regarding the structure of the framework and the brand hierarchy tree.

4.5 Experimental duration

In order to decide on a reasonable experimental duration, two test trials were conducted. The trials indicated that the amount of time participants spent on reading the instructions and viewing the materials provided in Part 2 was comparable to the time participants spent on scouring and reviewing reference materials in Part 1. Therefore, the same amount of time was allocated to both parts. The test trials showed that 30 minutes per part resulted in reasonable concept quality, without making the designers feel uncomfortably rushed. The total experiment time, including the background survey and reflections, was set to 90 minutes.
Chapter 5

Evaluation methodology

Visual evaluation may be regarded as a challenging matter. The task is highly subjective; people have different opinions, which are to a large extent grounded in their personal experiences with the brand and the product. For that reason, two initial, explorative evaluation approaches were conducted. The initial evaluations included an online expert panel survey (Expert Evaluation 1), and a visual design analysis performed by the author. Based on results and feedback obtained from the initial approaches, a third and final evaluation method was developed (Expert Evaluation 2). The initial evaluation methods are presented in this chapter; however, emphasis has been put on Expert Evaluation 2, which generally produced data with higher inter-rater reliability, and indicated proper level of dedication among the expert evaluators.

5.1 Preparation of drafts

Sketch quality can potentially affect how a person responds to a product concept (Macomber & Yang, 2011). Therefore, all design drafts were translated to the same format. Drafts were scanned into a computer, and form elements and lines defined by the participants were traced in vector graphics software. Elements were colored with a gray scale. Participants used pens or gray markers to create sketches but were requested to specify details, including colors and material, by including notes and arrows. These notes were also traced in the vectors-based software. Line width was consistently set to 1.0pt, with the exception of small details, for which 0.5pt line width was used. Gradients were only applied for the center section of the camera lens, except in one other instance, in a product draft where this seemed essential in
order to convey a central design feature. Opacity was only utilized to illustrate transparent plastic features.

Design drafts were arranged on one horizontal Letter sized “art board” each. Furthermore, these art boards were arranged using the same basic layout: two main product views with notes, and a list of features and factors declared by the participant during the experiment reflection. Some participants spent time defining features on the back of the camera, and in these cases a third miniature view was included.

5.2 Expert Evaluation 1

The evaluation panel consisted of four experts in the field. They were all employed in academia and were, or had previously been, working on topics related to visual brand identity. These experts evaluated each design draft on a seven-point Likert scale, based on the five criteria shown in Table 10. Questions 1 (a) and (b) are directly tied to the POD concept, while question 2 assesses POPs. An overall score was included to give experts a way to evaluate the product gestalt as a whole, since different combinations of POD and POD features may be perceived as more appropriate. One of this study’s aims was to derive a framework that would allow for designers’ creativity to flourish; hence the inclusion of question 4.

<table>
<thead>
<tr>
<th>Number</th>
<th>Question/Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>In your opinion, does the product communicate the case brand’s...</td>
</tr>
<tr>
<td>(a)</td>
<td>current visual design language?</td>
</tr>
<tr>
<td>(b)</td>
<td>semantic function to express (storytelling factors)?</td>
</tr>
<tr>
<td>2</td>
<td>Does the product reflect the current product sign?</td>
</tr>
<tr>
<td>3</td>
<td>Overall product extension score</td>
</tr>
<tr>
<td>4</td>
<td>Creativity level of concept</td>
</tr>
</tbody>
</table>

The evaluation process was divided into two survey sections, one for each case. For each case, the experts were primed with background material. The background material included a brand hierarchy map, pictures of the case brands’ existing products, pictures of existing products in the market segment of interest, and a map of design features commonly employed by each brand.
5.3 Design analysis

A visual design analysis of each design draft was conducted. The analysis was based on the design features deduced by the brand’s existing product portfolio. Hence, the design drafts were evaluated on the level of presence of design features defined by prior analysis of the target brand’s product portfolio. The analyses of B&O PLAY’s and Dyson’s portfolios were conducted in accordance with methodology proposed by Warell and Nåbo (2002), addressed in Section 2.6.3. Portfolio analyses can be found in Appendix B. Product drafts were analyzed based on the same methodology, hence two points were assigned if the correlation between product draft and feature was perceived as strong, while if correlation existed but in a less evident manner, one point was assigned. A scoring table was developed for each brand, with the intention of making the task somewhat less subjective. Even though the design features and scale limits were identified based on subjective interpretation, the scoring tables provided a reference, allowing for more consistent evaluation of the design drafts (see Tables 11 and 12).

Table 11: Scoring table – B&O PLAY

<table>
<thead>
<tr>
<th>Features</th>
<th>One point</th>
<th>Two points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular forms</td>
<td>Circular form is a part of the product</td>
<td>A circular form or forms define the product gestalt</td>
</tr>
<tr>
<td>Rectangular forms</td>
<td>Rectangular form is a part of the product</td>
<td>A rectangular form or forms define the product gestalt</td>
</tr>
<tr>
<td>Curved forms</td>
<td>Curved form is a part of the product</td>
<td>A curved form or forms define the product gestalt</td>
</tr>
<tr>
<td>Connected volumes</td>
<td>A notion of two or more connected volumes, however less evident</td>
<td>Connected volumes are central to the product gestalt</td>
</tr>
<tr>
<td>Conical volumes</td>
<td>A notion of a conical volume, however less evident</td>
<td>A conical form or forms define the product gestalt</td>
</tr>
<tr>
<td>Sharp edges</td>
<td>Sharp edges are somehow incorporated in the design, however less evident</td>
<td>Sharp edges are central to the product gestalt</td>
</tr>
<tr>
<td>Radii</td>
<td>Radii are somehow incorporated in the design, however less evident</td>
<td>Radii are central to the product gestalt</td>
</tr>
<tr>
<td>Chamfers</td>
<td>Chamfers are somehow incorporated in the design, however less evident</td>
<td>Chamfers are central to the product gestalt</td>
</tr>
<tr>
<td>Metal finishes</td>
<td>Noted on draft</td>
<td>Noted and indicated as the product’s base finish</td>
</tr>
<tr>
<td>Natural materials</td>
<td>Natural materials are somehow incorporated in the design, however less evident</td>
<td>Natural materials are central to the product gestalt</td>
</tr>
<tr>
<td>Hole patterns</td>
<td>Hole patterns are somehow incorporated in the design, however less evident</td>
<td>Hole patterns are central to the product gestalt</td>
</tr>
<tr>
<td>Color options</td>
<td>Noted on draft</td>
<td>Specified where accent color is to be applied and/or stated colors</td>
</tr>
</tbody>
</table>

59
Table 12: Scoring table – Dyson

<table>
<thead>
<tr>
<th>Features</th>
<th>One point</th>
<th>Two points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extruded forms</td>
<td>Extruded form is a part of the product</td>
<td>An extruded form or forms define the product gestalt</td>
</tr>
<tr>
<td>Cyclones</td>
<td>Cyclones are somehow incorporated in the design, but less evident</td>
<td>Cyclones are central to the product gestalt</td>
</tr>
<tr>
<td>Grey plastic</td>
<td>Noted on draft</td>
<td>Noted and indicated as the product's base color and material</td>
</tr>
<tr>
<td>Transparent plastic</td>
<td>Applied to the dust compartment</td>
<td>Applied to dust compartment and other features</td>
</tr>
<tr>
<td>Accent color</td>
<td>Noted on draft</td>
<td>Specified where accent color is to be applied</td>
</tr>
<tr>
<td>Semi mate finish</td>
<td>Noted on draft</td>
<td>Noted and indicated as the product's base finish</td>
</tr>
<tr>
<td>Spherical volumes</td>
<td>Spherical volumes are somehow incorporated in the design, however less evident</td>
<td>Spherical volumes are central to the product gestalt</td>
</tr>
<tr>
<td>Hole pattern</td>
<td>Hole patterns are somehow incorporated in the design, however less evident</td>
<td>Hole patterns are central to the product gestalt</td>
</tr>
<tr>
<td>Curved surfaces</td>
<td>Curved surfaces are somehow incorporated in the design, however less evident</td>
<td>Curved surfaces are central to the product gestalt</td>
</tr>
<tr>
<td>Red indications</td>
<td>Noted on draft</td>
<td>Specified feature where red indicating color is to be applied</td>
</tr>
</tbody>
</table>

With the prior design portfolio analysis and the two tables as reference, design drafts were analyzed using the methodology proposed by Warell (2004), addressed in Section 2.6.4. Form elements were identified, and notes and comments were examined to detect features such as coloring, material, and finishes. Figure 15 presents an example of a design analysis of a camera draft indented for B&O PLAY.
The red stroke indicates a profile that, when extruded, dictates the general shape of the camera. The extruded form can be seen as significant to the product gestalt (two points). In addition, the extruded profile has been given striking radii (two points). The leather grip highlighted by the blue strokes has some volume, and is joined together with the camera body. The notion of joined parts is present, but not distinct (one point). The leather grip as a whole can be seen as a central part of the camera gestalt. Therefore, the draft receives two points for use of natural material. The microphone holes, indicated by the green stroke, are considered a less evident hole pattern (one point). Two buttons indicated by the yellow stroke comprise circular shapes. However, the feature cannot be considered central to the product gestalt (one point). Distinct chamfers are incorporated in the top and bottom edges of the camera case (two points). Color choice/option is mentioned as a brand identity factor. However, actual color alternatives or sections for color alternation are not elaborated (one point).
By repeating the process described above on all design drafts, a scoreboard was generated. The difference in score between the control and framework scenarios was then be compared by using bootstrapping analysis.

5.4 Expert Evaluation 2

In this section, the motivation behind Expert Evaluation 2 is presented, and new methodology and procedures are described. For motivation purposes, results from Expert Evaluation 1 are partly displayed in this section. The results are however further addressed in Chapter 6.

5.4.1 Motivation

Based on results from Expert Evaluation 1, feedback from participating experts, and the visual analysis, a new evaluation was developed and conducted. The aim with the new evaluation was to obtain data with improved inter-rater reliability, and to ensure that evaluators were fully dedicated to the task.

The first expert evaluation exhibited no significant difference in average rating, while the visual design analysis indicated a significant difference in terms of number of incorporated design features. Furthermore, the data obtained from the four experts participating in Expert Evaluation 1 had low inter-rater reliability, ranging from an alpha of 0.21 to 0.46. Since only four experts participated, the low inter-rate reliability raised concerns. Another problematic observation was the difference in survey completion time. Experts' survey completion time ranged from 4-13 minutes per case. One expert in particular, who spent 4 and 6 minutes evaluating each case respectively, rated drafts consistently in the mid-range. Moreover, two out of four experts provided spontaneous feedback upon completion of the first evaluation, indicating a few concerns. Two citations from these experts are provided blow.

"It was difficulty to get a good overview of the material while filling out the survey."

"In this survey format, I think questions need to be more specific. I found it hard to evaluate all concepts with precision."

Furthermore, while the visual design analysis indicated significance, it should be noted that a higher number of incorporated design features in a product might not necessarily mean that the product expresses the brand's visual design language in a more advantageous way. Some features might be more predominant, and if a feature with such characteristics is incorporated in a bold manner, the product might be
perceived as expressive of the brand’s design language. However, it is the combination of the visual design analysis showing a significant difference, with the substantial differences in evaluator engagement, low inter-rater reliability, and feedback from the expert participants that constitutes the motivation behind Expert Evaluation 2.

5.4.2 Development of new evaluation methodology

The experts in the first evaluation received background material for each case. However, since the evaluation was performed online, experts felt it was hard to obtain a good overview of the material as they scored the product drafts. Thus, one of the goals with Expert Evaluation 2 was to provide participants with clear instructions and an obvious, fixed, visual reference. A clear reference was introduced to ensure that experts evaluated the drafts based on the brand’s current products, reflecting the brand’s current visual design language, and not based on their own experience with the brand and product type. As such, evaluators should have a profound ability to visually analyze products.

Seven individuals with expert knowledge in visual design were recruited. The experts had a profound background in the field of industrial design and were currently professors, lecturers, or doctoral students at universities with industrial design-oriented educational programs. Their current research was related to visual product design, form development, or visual branding. The group was culturally diverse; three continents were represented. Gender diversity comprised of two female and five male participants.

Expert Evaluation 2 was performed on an ordinal ranking scale, commonly applied in marketing research settings (MSG). The Likert scale, applied in Expert Evaluation 1, is also an ordinal scale. Ordinal data cannot generally be treated as continuous data, since it is not possible to know the distance between each rank, or in the Likert case, each ordered value. Thus, parametric analysis approaches such as the mean and standard deviation are not suitable. For this type of data, non-parametric approaches are recommended, one example being the median. However, though not statistically justified, it has become common practice to assume that Likert categories are ordered with equal distance, and to therefore treat the data as continuous. For ordinal ranking data, this is a concern since the distance between ranks may be even more ambiguous. However, for the purposes of positioning and identifying a rough picture, the ordinal ranked measurements were treated as continuous data in this study.
Participants were asked to rank product drafts for each brand respectively, from 1-10. Experts had the reference material, printed on A3 paper, on a table in front on them during the entire evaluation process.

Experts were given a set of 10 A4 sized papers, on which each product draft was presented. The pile was randomized before each evaluation trail. Experts ranked the design drafts by sorting them from left to right, i.e. from “rank 1” to “rank 10”. The intention with this layout was to allow the evaluator to have a constant overview of the reference material and the design drafts at the same time. Thus, drafts could be sorted, compared, and ranked against each other in an intuitive manner. Product drafts were evaluated based on three criteria, presented in Table 13.

<table>
<thead>
<tr>
<th>Number</th>
<th>Question/Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Communication of the brand’s existing design language</td>
</tr>
<tr>
<td>2</td>
<td>Communication of current product sign</td>
</tr>
<tr>
<td>3</td>
<td>Creativity level of concept</td>
</tr>
</tbody>
</table>

Expert Evaluation 1 included two additional criteria: semantic functions to express/storytelling factors, and an overall score. Participants in Expert Evaluation 1 rated the questions concerning the communication of visual design language and the communication of semantic function to express (storytelling factors) nearly identically. A potential reason might be the challenge of identifying these factors rapidly, especially since the drafts only indicated materials, textures, and colors in written form. Providing the experts with more suitable reference material, such as a branding catalog might have helped. However, having experts review brand catalogs would have prolonged the evaluation duration significantly, and recruiting participants would have been more challenging. The results from Expert Evaluation 1 suggested that evaluators, during these circumstances, might take “storytelling factors” into account when assessing the communication of visual design language.

Furthermore, the overall score was not included in Expert Evaluation 2, since feedback from Expert Evaluation 1 suggested that the questions should be more specific. The question might leave the experts wondering on what they should focus. As a result, the score would be based on experts’ own interpretation of the question. Since a panel with a limited number of experts was utilized, it seemed reasonable to focus on more defined questions.
Figure 16 demonstrates how the tables and material were organized. To allow for two evaluations simultaneously, tables were placed at opposite sides of a room, limiting the possibility of participants influencing each other. Three test trials indicated that the evaluation duration would last 30-45 minutes. As the evaluation was conducted via in-person meetings, the evaluation duration was easily tracked. Experts were provided with an instruction sheet, presented in Figure 17.
Evaluation of Design Drafts

You will be asked to rank product drafts created for B&O PLAY and Dyson, on three different criteria. There are 10 drafts per brand, which should be ranked from 1 to 10.

Please base your decisions on comparison between the design drafts, and use the pictures on the table in front of you as reference.

---

Ranking Criteria

1. Communication of the brand’s existing design language.
   (For this criterion please use the pictures on the left-hand side as reference.)

2. Communication of current product sign. In other words, how well does the product draft express affiliation with the intended product segment?
   Attributes to consider might be: Product Components, Product Organization/Structure, Ergonomic and Communicative Elements, etc.
   (For this criterion please use the pictures on the right-hand side as reference.)

3. Creativity level of product draft.

Figure 17: Evaluation instructions
Chapter 6

Results

This chapter presents the results of the experimental evaluation. Data and results from the statistical analysis of Expert Evaluation 1, the visual design analysis, and Expert Evaluation 2 are presented. Expert Evaluation 2 is analyzed in greater depth, since it, as the chapter will unveil, resulted in the most reliable data. In addition, the chapter outlines the results from the assessment of participating designers’ ability to identify design features and explain their drafts. Designers’ initial approaches to the task are presented. Lastly, designers’ attitudes towards the framework are exhibited.

The derived framework, presented in Chapter 3, is considered an intermediate result on its own. Design drafts created by the experiment participants are presented in Appendix C and D.

6.1 Initial evaluation

6.1.1 Expert Evaluation 1

Survey data were examined using bootstrap analysis, addressed in Section 2.6.1. In Expert Evaluation 1, participants evaluated each product draft on five different criteria, using a seven-point Likert scale. Mean score differences between the control and framework scenario were compared using 1,000 bootstrap samples and a 95% confidence interval (CI). Table 14 presents observed mean differences as well as mean differences and confidence intervals constructed from the bootstrap data.
Table 14: Bootstrap comparison – Expert Evaluation

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Lower CI bound</th>
<th>Upper CI bound</th>
<th>Mean diff.</th>
<th>Observed diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a (Design language)</td>
<td>-0.75</td>
<td>1.40</td>
<td>0.35</td>
<td>0.38</td>
</tr>
<tr>
<td>1b (Storytelling)</td>
<td>-0.80</td>
<td>0.95</td>
<td>0.07</td>
<td>0.05</td>
</tr>
<tr>
<td>2 (Product sign)</td>
<td>-0.35</td>
<td>0.78</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>3 (Overall)</td>
<td>-0.65</td>
<td>0.80</td>
<td>0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>4 (Creativity)</td>
<td>-1.00</td>
<td>0.93</td>
<td>-0.07</td>
<td>-0.05</td>
</tr>
</tbody>
</table>

As seen in Table 14, the confidence intervals constructed for each criterion all include the mean difference of zero. Consequently, the null hypothesis that the designers performed equally in both scenarios is not rejected. In other words, according to the four experts, the proposed framework had no significant effect on the designers with regards to these five criteria.

On the seven-point Likert scale, experts’ answers sometimes differed by five and four points for a specific criteria and draft. This indicates that the agreement among experts was low. Given that a small number of experts participated in the evaluation, substantial differences in answers are likely to generate answers in the mid-range. Inter-rater reliability of experts’ scores was calculated for each criterion respectively (see Table 15). Values fall well below alpha = 0.67, which is considered to be the limit for satisfactory alpha, see Section 2.6.2.

Table 15: inter-rater reliability for each criterion – Expert Evaluation

<table>
<thead>
<tr>
<th></th>
<th>1a (Design language)</th>
<th>1b (Storytelling)</th>
<th>2 (Product sign)</th>
<th>3 (Overall)</th>
<th>4 (Creativity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>0.46</td>
<td>0.21</td>
<td>0.24</td>
<td>0.23</td>
<td>0.32</td>
</tr>
</tbody>
</table>

6.1.2 Visual design analysis

A visual design analysis of each design draft was conducted following the methodology described in Section 2.6.4. The analysis focused on the incorporation of design features deduced by the brand’s product portfolio analysis. Scores for each product draft are presented in Table 16.
Table 16: Scoreboard from the visual design analysis

| Feature             | Participant # | Dyson 1 | Dyson 2 | Dyson 3 | Dyson 4 | Dyson 5 | Dyson 6 | Dyson 7 | Dyson 8 | Dyson 9 | Dyson 10 | B&O PLAY 1 | B&O PLAY 2 | B&O PLAY 3 | B&O PLAY 4 | B&O PLAY 5 | B&O PLAY 6 | B&O PLAY 7 | B&O PLAY 8 | B&O PLAY 9 | B&O PLAY 10 |
|---------------------|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Extruded forms      |               | 2       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 2       | 1         | 1           | 1           | 1           | 1           | 2           | 2           | 1           | 1           | 1           | 1           |
| Cyclones            |               | 2       | 2       | 1       | 1       | 1       | 1       | 2       | 2       | 2       | 2         | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           | 2           |
| Grey plastic        |               | 2       | 2       | 1       | 1       | 1       | 1       | 2       | 2       | 2       | 2         | 1           | 1           | 1           | 1           | 2           | 2           | 2           | 2           | 2           | 2           |
| Transparent plastic |               | 1       | 1       | 1       | 2       | 1       | 1       | 2       | 2       | 2       | 2         | 1           | 1           | 1           | 1           | 1           | 2           | 2           | 2           | 2           | 2           |
| Accent color        |               | 1       | 1       | 2       | 2       | 1       | 2       | 2       | 2       | 2       | 2         | 1           | 1           | 1           | 1           | 2           | 2           | 2           | 2           | 2           | 2           |
| Semi mate finish    |               | 1       | 2       | 1       | 2       | 2       | 2       | 1       | 2       | 2       | 2         | 1           | 1           | 1           | 1           | 2           | 2           | 2           | 2           | 2           | 2           |
| Spherical volumes   |               | 2       | 2       | 2       | 1       | 1       | 2       | 2       | 2       | 2       | 2         | 1           | 1           | 1           | 1           | 2           | 2           | 2           | 2           | 2           | 2           |
| Hole pattern        |               | 1       | 1       | 1       | 1       | 1       | 2       | 2       | 2       | 2       | 2         | 1           | 1           | 1           | 1           | 2           | 2           | 2           | 2           | 2           | 2           |
| Curved surfaces     |               | 1       | 1       | 1       | 2       | 1       | 1       | 2       | 2       | 2       | 2         | 1           | 1           | 1           | 1           | 2           | 2           | 2           | 2           | 2           | 2           |
| Red indications     |               | 1       | 2       | 1       | 2       | 2       | 2       | 1       | 2       | 2       | 2         | 1           | 1           | 1           | 1           | 2           | 2           | 2           | 2           | 2           | 2           |
| SUM                 |               | 10      | 5       | 3       | 8       | 5       | 12      | 9       | 7       | 5       | 9         | 8           | 7           | 7           | 13          | 7           | 7           | 7           | 7           | 7           | 7           |
| Framework/Control   |               | F       | C       | C       | C       | F       | C       | F       | C       | F       | C         | F           | F           | C           | C           | C           | C           | F           | F           | C           | F           |

The differences in scores between the control and the framework scenario were then analyzed using bootstrap comparison. Table 17 presents the observed mean difference, as well as the bootstrap sample mean difference and boundaries corresponding to the 95% confidence interval. As can be seen, the lower bound is greater than zero. Thus, the observed difference is said to be statistically significant. In other words, according to the author's design analysis, participants scored significantly higher when using the proposed framework. A higher score indicates that the participants incorporated a larger number of design features and/or more distinct design features.

Table 17: Bootstrap comparison – Visual design analysis

<table>
<thead>
<tr>
<th>Lower Cl bound</th>
<th>Upper Cl bound</th>
<th>Mean difference</th>
<th>Observed mean difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.90</td>
<td>5.00</td>
<td>3.57</td>
<td>3.60</td>
</tr>
</tbody>
</table>

6.2 Expert Evaluation 2

In accordance with the methodology addressed in Section 5.4.2, seven experts were asked to rank the product drafts from 1 to 10 on three different criteria: (1) communication of existing design language, (2) communication of current product sign, and (3) creativity level of product draft. Raw data produced by the experts can be found in Appendix E. For the purpose of forthright interpretation and analysis, ranks have been given "pseudo-scores". This means that the usual ranking order (1,
2, 3...10), from “best” to “worst”, has been switched to scores (10, 9, 8...1). The differences in mean scores between drafts created during the control and framework scenario were analyzed to determine whether the observed difference could be regarded as significant or not. Data generated by the experts were first examined using bootstrapping analysis, addressed in Section 2.6.1. Distributions were produced with 1,000 bootstrap samples, for which a 95% confidence interval was constructed. Histogram plots of the bootstrap data, including confidence interval boundaries, are presented in Figure 18 below.

**Figure 18: Histograms showing bootstrap distributions for each criterion**
The results presented in the histograms above are summarized in Table 18. As can be seen, the 95% confidence intervals constructed for criteria 1 and 2 do not include the mean difference 0. Thus, the null hypothesis that the designers performed equally in both scenarios is rejected. In other words, the difference is said to be statistically significant. Furthermore, the confidence interval boundaries are both positive, which in this case means that the designers performed better during the framework scenario. The confidence interval constructed for criteria 3 does, however, include the mean difference 0. Thus, no significant difference is recorded. Inter-rater reliability for each criterion was calculated. As shown in Table 19, values range from 0.40 to 0.59, whereas in Expert Evaluation 1 values ranged from 0.21 to 0.46. (Alpha values were found to be 68% higher on average in Expert Evaluation 2.)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Lower Cl bound</th>
<th>Upper Cl bound</th>
<th>Mean diff.</th>
<th>Observed mean diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Design language)</td>
<td>1.01</td>
<td>3.36</td>
<td>2.25</td>
<td>2.23</td>
</tr>
<tr>
<td>2 (Product sign)</td>
<td>0.03</td>
<td>3.11</td>
<td>1.56</td>
<td>1.54</td>
</tr>
<tr>
<td>4 (Creativity)</td>
<td>-2.83</td>
<td>1.77</td>
<td>-0.44</td>
<td>-0.51</td>
</tr>
</tbody>
</table>

Table 19: Inter-rater reliability values for each criterion – Expert Evaluation 2

<table>
<thead>
<tr>
<th>Alpha</th>
<th>1 (Design language)</th>
<th>2 (Product sign)</th>
<th>3 (Creativity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40</td>
<td>0.59</td>
<td>0.48</td>
<td></td>
</tr>
</tbody>
</table>

Since the participants created a design draft during both scenarios, the difference in scores were also examined pairwise using the Wilcoxon signed-rank test. Figure 19 shows column plots of each designer’s mean framework and control scores. As seen in Table 20, significance is recorded for criterion 1, while the other criteria fail to reject the null hypothesis that the median difference between paired measurements is zero, i.e. that the numbers of differences in each direction are equal.

<table>
<thead>
<tr>
<th>p-value (two-tailed)</th>
<th>1 (Design language)</th>
<th>2 (Product sign)</th>
<th>3 (Creativity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0098</td>
<td>0.23</td>
<td>0.73</td>
<td></td>
</tr>
</tbody>
</table>
Figure 19: Column plots for each criterion indicating designers' differences in mean score.
Lastly, the Fisher’s exact test was applied to address the assumption that the two rankings for B&O PLAY and Dyson line up. The test seeks to determine if a significant portion of draft created by designers while applying the framework were among the “best” ranked. The drafts that received mean scores equal to or greater than the median rank score are categorized as “high ranked”, while draft with mean scores less than the median are categorized as “low ranked”.

Following the theory addressed in Section 2.6.1, contingency tables for each criterion was created. Table 21 shows the contingency table created for criterion 1. Two-tailed p-values for each criterion were calculated.

<table>
<thead>
<tr>
<th>Framework</th>
<th>High ranked group</th>
<th>Low ranked group</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Column Total</td>
<td>11</td>
<td>9</td>
<td>20</td>
</tr>
</tbody>
</table>

10 out of 20 drafts were created while the framework was applied, 9 out of the 20 are grouped as “high ranked”. Assuming the null hypothesis that “high ranked” and “low ranked” drafts are equally likely to have been created while applying the framework, the Fisher’s test seeks to determine what the probability is that the 10 framework drafts would be so unevenly distributed between the “high ranked” and “low ranked” groups. Significance is recorded for criterion 1 (see Table 22).

<table>
<thead>
<tr>
<th>1 (Design language)</th>
<th>2 (Product sign)</th>
<th>3 (Creativity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-value (two-tailed)</td>
<td>0.0055</td>
<td>0.18</td>
</tr>
</tbody>
</table>

6.3 Assessment of designers’ ability to identify design factors

After each scenario (control and framework) designers were asked to describe which visual design features they had incorporated and which storytelling factors they had tried to convey. When design drafts were translated to the same format, these features and factors were listed in the margin of the art board. Features and factors were counted and differences between the control and framework scenarios could then calculated. Bootstrapping analysis and the Wilcoxon signed-rank test was applied to determine the statistical significance of these differences. A scoreboard is presented in Table 23, and histograms of bootstrap samples are presented in Figure 20.
Table 23: Scoreboard showing the number of identified features and factors for each design draft

| Participant # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---------------|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|---|---|
| Design features | 6 | 3 | 4 | 6 | 5 | 3 | 5 | 7 | 6 | 3 | 5 | 5 | 3 | 4 | 4 | 7 | 3 | 3 | 3 | 7 |
| Storytelling factors | 3 | 1 | 2 | 3 | 2 | 2 | 3 | 4 | 3 | 1 | 4 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 4 |
| Framework/Control | F | C | C | F | C | C | F | F | C | F | F | C | C | C | C | F | C | C | C | F |

Figure 20: Histograms showing bootstrap distributions for features and factors

As can be seen in Table 24 below, the difference is statistically significant on the 95% confidence interval in both cases, according to the bootstrapping analysis. In agreement, the Wilcoxon signed-rank test recorded the two-tailed p-values 0.016 (features) and 0.023 (factors). Thus, participants identified a larger number of design features and storytelling factors when applying the framework.
Table 24: Bootstrap comparison – Identification of brand-related features and factors

<table>
<thead>
<tr>
<th></th>
<th>Lower CI bound</th>
<th>Upper CI bound</th>
<th>Mean diff.</th>
<th>Observed mean diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design features</td>
<td>0.90</td>
<td>3.10</td>
<td>1.98</td>
<td>2.00</td>
</tr>
<tr>
<td>Storytelling</td>
<td>0.30</td>
<td>1.60</td>
<td>0.99</td>
<td>1.00</td>
</tr>
</tbody>
</table>

6.4 Assessment of designers’ own approaches

Based on the field notes taken during the observation of the control scenario, and on designers’ responses to the first part of experiment reflection 1 (i.e. “explain your design process”), participants’ own approaches to the task were qualitatively assessed. Overall, designers followed the same general steps. However, there are a few differences in terms methodology and order of completion. In addition, different approaches for displaying scoured reference material were found. The identified general steps include:

- Procurement of visual references/inspiration related to the brand
- Procurement of visual references/inspiration related to the market segment, or in some cases merely the product type
- Displaying procured material
- Taking notes
- Initial sketching

Visual references to the brand were frequently obtained by using online search engines. Participants searched for pictures using the image search function in Google Search, for example, or located the brand’s official website.

Product-related visual references were also frequently sourced by image search. Other online means included exploration of product review websites, non-specialized e-commerce websites, and product-specific blogs. Product dimensions were in one case explored using accessible office artifacts.

The majority of participants used the pictures’ original location in the web browser as method for exhibition. One participant image searched reference material for the brand and the product category in two different browser windows and placed them on two separate computer screens to allow for a good overview. Another participant created a “mood board” in Adobe Illustrator including, according to the participant, the most relevant reference material.
Seven participants took some type of notes, either during the search for reference material or before starting sketching. Five of the seven listed parameters related to the brand’s visual design language and storytelling factors, while the other two, in addition to brand related parameters also listed functional and product-specific attributes.

Designers initiated their sketching processes in different ways and applied different strategies. However, the majority researched visual references related to both the brand and the product before initiating sketching. One designer stated that he preferred to do a lot of research before starting to draw, while others sketched general shapes early on and went back and forth between research and sketching throughout the experiment. Sketch iterations also varied between designers. Some started by making several small sketches before deciding on one final concept with which to continue. Other, more research-focused, designers stayed with one concept. One participant initiated the sketching process by tracing a design feature from one of the brands’ existing products, and built a product draft around that.

6.5 Designers’ attitudes towards the proposed method

The assessment of participants’ attitudes is based on experiment reflection 2, which presented designers with two open-ended questions related to their views on the proposed framework.

1. What are your thoughts on the structure of the framework?
2. What are your thoughts on the brand and product map?

The designers’ responses are presented in Table 25 below. The responses were examined to determine whether they emphasized a positive, neutral, or negative attitude towards the structure or the inclusion of the brand and product map.

Nine participants expressed positive comments with regard to both matters. The designers typically stated benefits in terms of structured workflow, time efficiency, market research, and the ability to view the reference material holistically. In terms of the brand and product map, positive comments were related to product and brand organization and product categorization. Designers who applied the framework to the B&O PLAY case especially appreciated the brand and product map.
“This was new to me and I find it very effective. We will try this on some of our clients’ projects. I think this could also help when talking to clients; it is a great way to explain reasoning.” (Participant #3) – A designer working at a small design studio

Participant #7 expressed several strengths of the framework, but stated a preference for the first scenario. The participant indicated two reasons to his preference. The designer felt more satisfied with the draft created during the first scenario, but explained that he also knew more about that specific brand case brand, which the background survey likewise indicated. A two-point difference on the five point Likert scale was recorded by the survey. In addition, the participant stated that he recently graduated, and had predominantly worked on “change the world type of products”, for which he usually applied a less restrictive approach to as well.
### Table 25: Designers' views on structure of the framework and inclusion of the brand and product map

<table>
<thead>
<tr>
<th>Participant #</th>
<th>Framework structure</th>
<th>Brand and product map</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I think it is important to have knowledge about the visual sign in the market segment. You want to help the consumer to find “right” among the different product types. The material helped me to quickly sort elements. It provided some structure.</td>
<td>I think it is a good way of visualizing product placement, and it might be a good thing to do before starting off designing a new product.</td>
</tr>
<tr>
<td>2</td>
<td>The first step also served as a market research, which is a good starting point for this kind of task. The material on the brand provided a clear overview of the brand’s design language.</td>
<td>The map helped me understand B&amp;O PLAY’s position compared to the central B&amp;O brand. Saves a lot of time.</td>
</tr>
<tr>
<td>3</td>
<td>Great way to start a session. Provided good background knowledge. This was new to me and I find it very effective. We will try this out on some of our clients' projects. I think this could also help when talking to clients; it is a great way to explain reasoning.</td>
<td>It provided a good overview of the brand.</td>
</tr>
<tr>
<td>4</td>
<td>It was very effective to divide it into distinct parts; it provided good structure. I also think the same layout can be used when designing for a special target audience or theme, instead of a brand.</td>
<td>It is good to have that understanding as you start the idea generation.</td>
</tr>
<tr>
<td>5</td>
<td>I think it can be useful to really prepare this type of document; it makes it so much clearer.</td>
<td>It was useful. It made it much easier to understand the placement of B&amp;O PLAY and its product categories.</td>
</tr>
<tr>
<td>6</td>
<td>This is important, and I liked to have material collected. Good overview.</td>
<td>It really helped in terms of understanding B&amp;O PLAY.</td>
</tr>
<tr>
<td>7</td>
<td>Good structure, I have not worked in this way before – with brand focus. I think I would have missed many things if we have not gone over the steps. On the other hand, I actually liked the open case better. I could be because I felt more satisfied with my design, I am more familiar with that brand and product (B&amp;O PLAY - compact digital camera vs. Dyson - robotic vacuum).</td>
<td>I thought it clarified the task. It had been useful for the B&amp;O PLAY part too, because of the relation to “regular” B&amp;O.</td>
</tr>
<tr>
<td>8</td>
<td>It really helped me, I am much happier with this second draft. Being able to see the whole product line helped. In the previous case, I only viewed one product at the time. Structure is good, I think. Getting constraints right is really important, then one can focus on being more creative within that frame.</td>
<td>I like it. I got a quick overview of the product categorization, could see fit in relation to categories, a view of cross-over details.</td>
</tr>
<tr>
<td>9</td>
<td>I liked the method a lot more actually. It seemed more focused. During the first case I did not understand the market segment, the method and material really helped with that – what the product is supposed to be compared with.</td>
<td>The map helped me understand product placement.</td>
</tr>
<tr>
<td>10</td>
<td>I got a great overview. Seems like it can save a lot of time – working methodically.</td>
<td>It made it easy to understand the relation between B&amp;O PLAY and Bang &amp; Olufsen.</td>
</tr>
</tbody>
</table>
Chapter 7

Discussion and conclusions

This chapter comprises discussion and conclusions related to the question formulation of this thesis. Each research question is discussed based on the results presented in Chapter 6, and conclusions are drawn. In addition, the framework, experiment methodology, and designers' attitudes are expanded upon. Lastly, possibilities for future work are addressed.

The main objective of this study was to investigate how industrial designers may in practice transfer an already established visual design language to new products. The study's purpose was to add knowledge to the field of visual design methodology, and to encourage further exploration in the area. The aim was to formalize a framework that is transparent and adaptable to various categories of consumer goods, a framework that both experienced and inexperienced designers can apply with confidence. Design is supposed to be a creative process. Hence, it was seen as crucial that the framework left room for the designers' creativity to flourish. A framework with the characteristics described above could have the ability to support newly employed in-house designers, and designers at design firms working with different clients. In addition, the framework could have educational applications, working as a tool to develop design students' ability to think about visual design in a strategic yet creative manner. Three research questions were formulated, which guided the direction of this study.
7.1 Designers' approaches to a brand extension task

Question 1: How do industrial designers approach a brand extension task?

During the assessment of participants' approaches to the task, presented in Section 6.4, it was found that designers generally followed a few general steps, even though methodology and order of completion differed. The steps involved:

- Procurement of visual references/inspiration related to the brand
- Procurement of visual references/inspiration related to the market segment, or in some cases merely the product type
- Displaying procured material
- Taking notes
- Initial sketching.

All these steps seem rather intuitive; in order to extend a brand's visual design language to a new product, one simply needs to consider visual references related to the brand and the product. The information has to be displayed in order for it to be visually examined. Notes are taken to store information from the examination, after which the sketching session is initiated. The difference may lie in the means by which material is sourced and displayed, and most importantly on which grounds design features are selected.

None of the participating designers stated that they applied any kind of logic reasoning or methodology to support and explain their selection of design features. In experiment reflection 1, designers were asked to describe their design process. Three quotes from answers intended to explain the reasoning during the selection of design features are presented below.

"I started with basic market research - scanned Dyson's visual language and robotic vacuums, then tried to 'melt' them together." (Participant #5)

"Sketched general shapes, then added details with B&O PLAY feeling." (Participant #8)

"I tried to pick what I like from B&O PLAY and combine it with other brands in similar categories." (Participant #9)

These answers indicate that designers may lack a concise way of communicating design intent. The process of selecting design features seems to be based, to a large extent, on the "touch and feel" of the designer. Words used to describe design intent
are in this case general and ambiguous in meaning. This suggests that the underlying reasoning related to design decisions is challenging to articulate; this is also acknowledged by Warell and Nåbo (2002). Furthermore, a conclusion based on these statements and the result presented in Section 6.4 is that industrial designers in fact think, to a certain degree, in terms of the POD and POP concepts proposed by Keller et al. (2012), since they consider reference material related to brand-specific and product-oriented characteristics. However, no general design process applicable to extensions of visual brands appears to be established.

7.2 Assessment of the framework

Question 2: Can a structured framework, based on established branding and visual design research, help designers create more successful brand extensions?

Designers' experiment performance was measured based on several different parameters. During the two expert evaluations a successful brand extension was defined based on branding theory, which suggested that the product should communicate the brand's existing characteristics and indicate product category affiliation. In addition, expert evaluations investigated perceived creativity level of each draft. Furthermore, performance was examined by conducting a visual design analysis of the drafts with regard to the brands' existing product portfolios. Participants' ability to identify design features and core brand values was investigated. Lastly, designers' attitudes towards the framework was explored.

7.2.1 Interpretation of results

Expert Evaluation 1 showed no significant difference among designers' performances. As addressed in Section 5.2, the evaluation posed reliability and expert engagement concerns, which led to the development of Expert Evaluation 2. All test results from Expert Evaluation 2 indicate significant differences in the drafts' ability to communicate the target brand's existing design language, based on whether the framework was applied or not. In addition, the bootstrapping comparison indicated significant difference in designers' ability to create drafts that show clear product category affiliation; however, significance was not indicated by the Wilcoxon signed-rank test and the Fisher's exact test. These results should not be viewed as definitive, since they are based on ordinal ranking data that were treated as continuous data. The results should rather be seen as a general first indication of designer performance. In spite of this, Expert Evaluation 2 was viewed as the more appropriate of the two experimental evaluations, due to improved
inter-rater reliability, consequent evaluator engagement, and positive feedback from participating experts. Difference in performance appeared to be more evident in terms of the drafts' ability to communicate the brand's visual design language, while the significance in difference in terms of the communication of current product sign was merely recognized by one statistical test. However, although it is beneficial if affiliation with the product category is evident, it does not have to be overly expressed. Nevertheless, it should be noted camera drafts created during the "control" scenario, in some cases, differed considerably from the typical layout of a camera in the target segment. Two drafts involved extruded and exchangeable lenses, one of which was placed on the right-hand side of the camera body. Cameras in the target segment, (compact/point-and-shoot digital camera, standard configuration, $250-400), are today signified by telescopic lenses, which are place either in the center or towards the left-hand side of the camera body (B&H Photo).

The visual design analysis indicated significant differences in participants' scores. A higher score while applying the framework indicates that participants incorporated a larger number of design features and/or more distinct design features. For both case brands, the existing product portfolio was first analyzed and score table was created, after which design drafts were analyzed and scored according to the table. It should be noted that the visual design analysis executed by the author, although performed in a methodically manner, is based on subjective identification of design features. Furthermore, it should be stressed that a higher number of incorporated design features in a product does not necessarily signify that a product expresses the brand's visual design language more clearly. Some features might be more predominant, and if a feature with such characteristics is incorporated alone in a bold manner, the product might be perceived as expressive of the brand's design language. As such, the results should not be considered a definite measurement of the success of the brand extension, but rather provide further indication that designers, while applying the framework, managed to incorporate a larger number of designer features in their designs.

Furthermore, participants identified a larger number of visual design features and core brand values when applying the framework. This is viewed as one of the more statistically sound results, since the features and factors were stated by the participating designers themselves. However, this does not necessarily mean that the features and factors were "correct" with regard to the brand, and it does not mean that they were incorporated in an identifiable way. Nevertheless, it does indicate that the framework helped designers to allocate more features and factors, thus leaving them with a larger "bank" of design parameters to consider as they initiated their concept development. There are many aspects of the framework that
could have helped in this case. One possible reason may be the attached lists of potential attributes to consider during each step, as it provided the designers with a starting point for their identification process.

Designers’ attitudes towards the proposed framework were generally positive, both in terms of structure and inclusion of the brand and product map (modified brand hierarchy tree). Reflection responses suggest that the designers appreciated the structured process of identifying design features related to the brand’s design language and the product’s target market segment. The framework’s structure was described as effective, and its ability to project a complete and holistic view of the reference material was mentioned as a major benefit. One designer expressed that the framework potentially could help him explain design reasoning to clients. In addition, several responses during experiment reflection 2 suggest that the brand and product map helped designers understand brand and product relation, which was part of the purpose of its inclusion. Designers who applied the framework to the B&O PLAY case especially appreciated the map, the reason being that it helped them understand the relation between B&O PLAY and Bang & Olufsen. One designer mentioned that it helped with finding “cross-over” details among product categorizations, which was the second part of the purpose of its inclusion.

As discussed above, the experiment provided several indications that the framework has the potential to help designers create more successful brand extensions. However, further investigation and evaluation are needed to determine this with certainty. Furthermore, there are several parts of the framework that could have had different levels of impact. Nevertheless, participants’ attitudes towards both the structure and the brand and product map were predominantly positive. Lastly, it should be noted that the study involved a substantial amount of subjective reasoning, even though steps were taken in order to make exploration as defined as possible given available resources.

7.3 Impact on creativity

Question 3: Does a structured method of this type limit designers’ creative abilities?

The expert evaluations indicated no significant difference in creativity level of the product drafts created by designers. Furthermore, survey responses indicated that the attitude towards the framework was mainly positive, which also may suggest that the framework’s structure was not seen as a concern in terms of the designers’
ability to work creatively. However, there was one exception. One participant expressed that he preferred applying a less directed design process. Experts did, however, rank the product draft he created while applying the framework as more creative. The participant explained his view by stressing that he had recently graduated, and that he had mainly worked on “change the word” types of products. Thus, this participant’s view might on its own indicate that there is a potential need to have a framework functioning as an educational tool for strategic visual design.

7.4 Evaluation methodology

7.4.1 Structure

The experimental duration for each scenario was short; designers spent 30 minutes creating each product draft. However, previous research suggests that initial concepts often tend to stay with designers’ (Warell & Näbo, 2001), which also functions as additional motivation for a framework of this nature. If initial concepts tend to stay with the designer throughout the development process, it appears essential to have a well-defined starting point, i.e. an established visual reference frame.

Since recruiting industrial designers, who had earned a degree and were active in the field, for a 90 minute long experiment was perceived as a challenging task, the experiment was designed to allow for a limited number of participants. For that reason all designers completed both scenarios: control and framework. Furthermore, the recruitment challenge led to a group of participants with a wide range of experiences and backgrounds. Therefore, designers’ performances was also assessed pairwise using the Wilcoxon signed-rank test.

The layout raises concerns in terms of fatigue after the first scenario and learning from the first scenario for the second scenario. The fatigue concern was partly addressed by a short 5-10 minute break between the two scenarios, and participants were offered refreshments if they so requested. Designers’ learning from the first case was not perceived as a major concern. The fundamental task was the same; the cases were however different in terms of branding strategies and visual design languages. Furthermore, participants were not provided with any information or material to foster learning during the first scenario.

As mentioned above, two different cases were applied in order to allow for a limited number of participants with different levels of experience. The two different cases could potentially have affected the experiment, depending on participants’
individual knowledge about the brand and familiarity with the product type. As an attempt to minimize these potential effects, cases were selected based on brand reputation, complexity of visual design language, and maturity of product sign. A complete view of the reasoning applied during the case selection can be found in Section 4.2. In addition, all participants indicated a level of familiarity with each brand in the background survey before the experiment started. The individual difference between familiarity levels ranged from zero to two on a five-point Likert scale, where the lowest recorded rating was two – “I know about them”.

**7.4.2 Expert evaluation**

Experts evaluated the concepts based on material similar to the case material provided during the framework scenario. Since the task was to evaluate how well each draft communicated: (1) the brands’ existing design language, and (2) the current product sign, reference material was adapted from (1) the brands’ official media channels and (2) specialized retailers, which materials were assumed to be “up to date”. Since expert evaluation was employed, this was viewed as the most valid option; it is after all the correct reference for an evaluation with these characteristics. In the future, other means of evaluation might be viable in order to avoid evaluation with similar material. This will be further addressed in Section 7.6.

**7.4.3 Comments on statistics**

The main purpose of the experiment was not to definitely determine whether the framework is a helpful tool to designers or not. The purpose was rather to explore whether a framework of this nature potentially has the ability to support designers as they approach a brand extension task. An ordinal rank order scale was used to make the task of visual evaluation more direct, by letting experts evaluate the concepts both against the reference material and against each other. Adapting a rank scale ensured that experts utilized the full scale, and were more devoted to the task. However, this comes with the drawback of added uncertainty regarding “distance” between each ranked product draft. Furthermore, even though Expert Evaluation 2 resulted in data with improved inter-rater reliability, the values did not fully reach the limit that is generally considered satisfactory. As mentioned in above section, other means of evaluation may be explored, which ideally also should allow for collection of data with higher inter-rater reliability. Potential future approaches are presented in Section 7.6.
7.5 Frameworks for visual design

Tools brought forward by researchers in the past, such as that of Warell and Nåbo (2002), are certainly interesting and fruitful, and especially useful in determining typicality of identified design features throughout a brand. However, to designers they may in some circumstances appear too static (Ekmekci, 2007). Furthermore, existing tools do not explicitly consider the organization of visual design languages. One reason may be that they mainly appear to have been explored in relation to car brands (Karjalainen, 2007), which generally employ a strong and similar design language throughout their entire portfolio. However, brands connected to smaller consumer products may find value in employing slightly different features among their product categories and lines, e.g. Bosch Power Tools. Thus, when considering a brand extension in the context of consumer goods, the task of identifying line and category-specific features becomes increasingly important. In comparison with existing tools, this study explored a framework that allows for more open assessment of features, while at the same time supporting designers in terms of identifying visual strategies. Two examples of design strategies were illustrated by the case brands in this study, Dyson and B&O PLAY. In addition, Bosch Power Tool’s strategy was addressed in Section 3.2, as the framework was introduced.

Another design strategy acknowledged by researchers (Karjalainen, 2006; Andersson, 2015) is characterized by extra attention to certain “lead products”, mainly applied by companies with larger product portfolios. Lead products communicate the brand’s identity in a particularly strong manner, and are created in a situation where it may be difficult for customers to recall the full product portfolio. The framework does not explicitly suggest that special attention should be paid to the concept of lead products. Instead it is advocated that all products should be considered, which of course would include products that may be categorized as lead products. Nevertheless, if the starting point is a brand with a large product portfolio, making the task of identifying design features difficult to comprehend, e.g. Bosch Power Tools, one may focus on a set of the brand’s most characteristic products in each other brand’s product categories or lines.

Finally, the framework does not apply the terms “explicit” and “implicit” references, advocated by researchers such as Karjalainen (2006). However, the framework suggests the investigation of visual design features as well as core brand values, which provides the designers with necessary information for the generation of both explicit and implicit design features. Since this study should be viewed as a first exploration of frameworks based on POP, POD, and brand hierarchy trees, inclusion
of additional terminologies unfamiliar to many practitioners would have made the task of meaningful experimental design and evaluation even more challenging.

7.6 Future work

Practical, supportive frameworks and tools in this line of work are lacking. Hence, future research in the area is highly encouraged. Future studies of similar nature, involving concept generation followed by evaluation, could be extended to a larger number of participants, both in terms of designers and evaluators. To achieve a high number of participating designers, future studies could for example be conducted in collaboration with institutions offering educational programs in the field of industrial design. Larger samples would allow for richer data collection and additional qualitative feedback on supportive frameworks’ potential benefits and limitations. As the framework might be useful in educational settings, such collaborations would be increasingly interesting to explore. In addition, studies in such settings may allow for an extended experimental duration, which could potentially result in more detailed product drafts and renderings, displaying complex shapes, materials, colors, textures, etc., in an intuitive manner.

Visual evaluation is an interest subject on its own. Various evaluation approaches were explored in this study, and there are further paths to investigate. The central issue when considering evaluation of brand extensions comes from differences among evaluators’ individual experiences with specific brands and products. Other deviations in perception may be connected to differences in social and cultural backgrounds. This a challenge not only for experimental evaluation purposes, but also for brands and their designers. A brand that is active on the global market has to communicate to individuals with different experiences and backgrounds. Brands can choose to apply different strategies in different regions, but there are economic benefits in terms of production and marketing costs, for example, and benefits related to global recognition in being able to apply a consistent universal design in all markets. Thus, added knowledge in areas related to customer perception is valuable. Perception becomes especially critical when considering communication of core brand values encoded in shapes and other design features, whereas communication of brand identity through recognizable consistency alone may be easier to detect.

Nevertheless, future studies could consider other rating-oriented approach that would allow for evaluation without extensive reference material, and collection of data with higher inter-rater reliability. One option may involve recruitment of
experts with high-level insight into the target brand’s visual language and the product category. Experts focusing on brand-related criteria could be recruited from management with knowledge in the area, flagship stores, or in-house design teams. Employees in stores specialized in the relevant product category could be recruited for product-related evaluation criteria.

A potential method applicable to evaluation of product perception might be visual pairwise “conjoint analysis”. The method has, for example, been explored in areas related to evaluation of individuals’ perceptions of different product packaging (Grobelny & Michalski, 2014), which implies that it could have applications in terms of product design perceptions as well. Analysis of this type would allow for comparison between two concepts at the time, while reference material, if needed, could be showcased simultaneously and kept the same for each concept pair. This would allow for pairwise and adaptive concept comparison.

Other means suitable for future product draft evaluations may involve identifying product attributes, such as design features or core brand values, based on a crowd assessment, potentially with the implementation of a “semantic differential scale”. Individuals could then be asked to evaluate each design draft based on the identified attributes, after which a model could be built to quantify the variable importance.

Part of the aim in deriving the framework was to provide designers with strategic support and a defined starting point, especially applicable to early idea generation, without overly restricting the creative essence many designers associate with design practices. However, the derived framework could be combined with other tools focusing on qualifying frequency of brand-related designer features, such as the method used for visual evaluation of the design drafts in this study. Equivalent tools could be applied to identify frequency of product category-specific features as well. Inclusion of tools with these characteristics would result in a more analytically oriented framework, potentially useful for detailing and evaluation of brand extensions.

Visual brand recognition plays a pivotal role for many companies today. Practical support for designers could help them create more aesthetically appealing and consistent product portfolios, for the benefit of both consumers and companies.
Bibliography


Appendices

Appendix A: Experiment introduction

Brief structure of the experiment

Designers are asked to create design drafts of two products, for two specific companies/brands. Each product will be considered a brand extension. Designers will sketch the products on paper or in electronic format; they should use the tool with which they are most comfortable working.

The experiment consists of two scenarios, which all participating designers will cycle through.
Scenario 1: Designers use their intuition or own methodology
Scenario 2: Designers are asked to apply a proposed design framework

Evaluation
"Experts" in the field will be asked to evaluate the design drafts based on a few parameters. Data from the evaluation will be analyzed, after which conclusions with regard to the two scenarios will be drawn.

Anonymity
Participants will be assigned numbers; no personal data will be accessible to anyone other than myself, Douglas Björkdal.

Participants will be able to retrieve their sketches after the evaluation is finalized.

Figure 21: Experiment introduction
Appendix B: Design format analysis

Figure 22: Design format analysis performed on B&O PLAY's product portfolio (Early 2015)
Figure 23: Design format analysis performed on Dyson's product portfolio (Early 2015)
Appendix C: Design drafts – B&O PLAY

Design drafts created by participating designers. (Translated format)

Figure 24: Participant #1 – Compact Digital Camera for B&O PLAY

Figure 25: Participant #2 – Compact Digital Camera for B&O PLAY
Compact Digital Camera for BeoPlay

Brand Identity factors
- Elegant contrast by using different materials and colors.
- The circular shape is dominant.
- Simple geometries are combined with advanced (but clean) curved surfaces.

Design factors:
- Precious metal colors
- Circular shapes
- Radii
- Natural materials, leather etc.

Storytelling factors:
- Premium
- Scandinavia

Participant #3

Figure 26: Participant #3 – Compact Digital Camera for B&O PLAY

Compact Digital Camera for BeoPlay

Brand Identity factors
- Elegant contrast by using different materials and colors.
- The circular shape is dominant.
- Simple geometries are combined with advanced (but clean) curved surfaces.

Design factors:
- Precious metal colors
- Circular shapes
- Radii
- Natural materials, leather etc.

Storytelling factors:
- Premium
- Scandinavia

Participant #4

Figure 27: Participant #4 – Compact Digital Camera for B&O PLAY
Compact Digital Camera for BeoPlay

**Front/Side**
- Large leather section, for grip and feel
- Button for picture taking and recording
- LCD screen on backside
- Mic, classic hole pattern
- Telescopic lens with chamfered edges
- Gold/Bronze anodized aluminum case

**Top**
- Flash pops out from case when needed
- Leather handle, can be folded in to camera side.
- Chamfered edges

**Brand identity factors**

**Design factors:**
- Clean simple geometry
- A fusion of modern and 1950-style
- Natural materials
- Several color options. For example pastel green or burgundy

**Storytelling factors:**
- A fusion of modern and 1950-style
- Fun elegance
- Personalization, options

**Participant #5**

Figure 28: Participant #5 – Compact Digital Camera for B&O PLAY

Compact Digital Camera for BeoPlay

**Front**
- Tan leather grip
- Button for picture taking and recording, placed on front for easy access in both horizontal and vertical orientation
- Mic. for video recording

**Top**
- Black top and bottom
- LCD screen on backside
- Chamfered edges

**Brand identity factors**

**Design factors:**
- Austere feel
- Machined look
- Color choice
- Circular shapes
- Symmetry
- Mix of chamfers and radii
- Hole patterns

**Storytelling factors:**
- More playful and young feeling (compared to B&O standard assortment)
- Using materials in a way that makes sense.
- A mix of B&O heritage and contemporary style.

**Participant #6**

Figure 29: Participant #6 – Compact Digital Camera for B&O PLAY
Compact Digital Camera for BeoPlay

Brand identity factors

Design factors:
- Circular forms
- Natural materials
- Usually a dramatic profile

Storytelling factors:
- Lifestyle brand
- Design + Tech
- Portability

Front/Back

- Fabric
- Flash
- Touch screen

Top

- Button for picture taking

Participation #7

Figure 30: Participant #7 – Compact Digital Camera for B&O PLAY

Compact Digital Camera for BeoPlay

Brand identity factors

Design factors:
- Simple lines
- Unique forms and materials
- Metal finish

Storytelling factors:
- Sophisticated
- Younger audience compared to "regular" B&O
- Same heritage, but not very classic.

Front

- Live viewfinder
- Hand grip
- "Rough" aluminum
- "Soft" aluminum
- BeoPlay logotype

Side

- Touch screen
- Extruded lens

Participation #8

Figure 31: Participant #8 – Compact Digital Camera for B&O PLAY

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Compact Digital Camera for BeoPlay

**Participant #9**

Brand identity factors

Design factors:
- Slim aesthetics
- Hole patterns
- Anodised finish

Storytelling factors:
- Cares about both aesthetics and technology
- Simplicity

Design factors:
- Clean lines
- Earthy color palette
- Colour options
- Nice material combinations, natural materials and metals
- Discrete logotype placement
- Circular and rectangular forms
- Hidden attachment elements

Storytelling factors:
- Premium
- Quality
- Simple elegance
- More fun and personal, compared to B&O

Figure 32: Participant #9 – Compact Digital Camera for B&O PLAY

Compact Digital Camera for BeoPlay

**Participant #10**

Brand identity factors

Design factors:
- Clean lines
- Earthy color palette
- Colour options
- Nice material combinations, natural materials and metals
- Discrete logotype placement
- Circular and rectangular forms
- Hidden attachment elements

Storytelling factors:
- Premium
- Quality
- Simple elegance
- More fun and personal, compared to B&O

Figure 33: Participant #10 – Compact Digital Camera for B&O PLAY
Appendix D: Design drafts – Dyson

Design drafts created by participating designers. (Translated format)

Robotic Vacuum for Dyson

**Front/Side**
- Similar nozzle profile
- Low profile nozzle
- Battery pack and engine housing

**Dust compartment in transparent plastic**
- Dyson's characteristic cyclones

**Brand identity factors**
- Design factors:
  - Technical appearance
  - Transparent dust compartment
  - Grey scale + accent color
  - Plastic
  - Semi matte finish
  - Geometric volumes
- Storytelling factors:
  - Tech-oriented
  - Futuristic
  - Quality with a notion of happiness

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**Participant #1**

Figure 34: Participant #1 – Robotic Vacuum for Dyson

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**Robotic Vacuum for Dyson**

**Front/Side**
- Bumper

**Top**
- 120 degree sweeping
- Turn handle to release compartment to empty
- Transparent dust compartment with integrated handle

**Brand identity factors**
- Design factors:
  - Transparent dust compartment
  - Plastic
  - Cyclones/Cones
- Storytelling factors:
  - Tech-oriented

---

**Participant #2**

Figure 35: Participant #2 – Robotic Vacuum for Dyson
Robotic Vacuum for Dyson

Design factors:
- Balance and geometry
- Circular shapes
- Cones
- Dark shades

Storytelling factors:
- Futuristic
- Industrial

Tie the two product categories (vacuums and fans) together with this robotic vacuum.

Participant #3

Figure 36: Participant #3 - Robotic Vacuum for Dyson

Robotic Vacuum for Dyson

Design factors:
- Chamfers
- Open in center, like the fans
- Anodized look
- Grey, white, blue
- Hovering futuristic look
- Extruded volumes

Storytelling factors:
- Futuristic
- Change and Difference
- Superior technology

Participant #4

Figure 37: Participant #4 - Robotic Vacuum for Dyson
Robotic Vacuum for Dyson

“Dyson ball technology”: The ball drives the vacuum.

Support wheels

Dust compartment opening

Dust compartment

Dust compartment

Motor cover

Omni wheels

Cyclones

Brand identity factors

Design factors:
- Dyson ball technology
- Plastic
- Obvious touch points
- Grey tones
- Modular

Storytelling factors:
- Innovative
- Hinted functionality in form

Figure 38: Participant #5 – Robotic Vacuum for Dyson

Participant #5

Participant #6

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Robotic Vacuum for Dyson

**Brand identity factors**

**Design factors:**
- Transparent dust compartment
- Grey plastic
- Accent color
- Show cyclones
- Dyson ball (Spheres)

**Storytelling factors:**
- Wants to make the world a better place with technology
- Performance driven
- Optimal suction

---

**Figure 40: Participant #7 – Robotic Vacuum for Dyson**

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Robotic Vacuum for Dyson

**Brand identity factors**

**Design factors:**
- Extruded parts
- Modular
- Pop color/accent
- Grey base color
- Plastic
- Round and spherical shapes
- Red indication of action elements

**Storytelling factors:**
- Function oriented
- Show superior tech
- Strong and bold
- Futuristic

---

**Figure 41: Participant #8 – Robotic Vacuum for Dyson**
Robotic Vacuum for Dyson

Front/Side
- Grey plastic body
- Wheels

Top
- Transparent dust compartment. Slightly dome-shaped.

Cyclones in circular formation. Color options.

Brand identity factors
Design factors:
- Transparent dust compartment
- Plastic
- Cyclones/Cones
- Grey base
- Accent color options
- Circular forms

Storytelling factors:
- Show off premium technology
- Futuristic
- Industrial

Participant #9

Figure 42: Participant #9 – Robotic Vacuum for Dyson

Robotic Vacuum for Dyson

Front/Side
- Transparent dust compartment
- Cyclones
- Cleaning rollers
- Wheels

Top
- Round display in center

Participant #10

Figure 43: Participant #10 – Robotic Vacuum for Dyson
Appendix E: Raw data – Expert Evaluation 2

Table 26: Raw data – Criterion 1

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Table 27: Raw data – Criterion 2

**Criterion 2: Product sign**

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Table 28: Raw data – Criterion 3

Criterion 3: Creativity

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