

Article

Aesthetics of Sustainability: Research on the Design Strategies for Emotionally Durable Visual Communication Design

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Abstract: Lately, most studies on sustainable design from the perspective of emotional durability focus on product design, particularly on exploring how do product functions direct consumers' emotional changes after the product is used, but overlook the significant impact of consumers' visual impression of the product on their judgment. Therefore, this paper aims at finding out how to maintain the emotionally durable connection between consumers and products with the help of visual communication design so as to provide guidance for prolonging the service life of products and reducing the waste and consumption of resources. Based on literature reviews on sustainable design, visual communication design, and emotionally durable design, this paper firstly adopted the case study method to analyze more than 85 high-quality design practice cases and put forward preliminary design strategies. The behavior research method was then applied to analyze the consumer behavior involved in the preliminary design strategies, and those design strategies were upgraded according to the analysis results. Based on the above analysis and research work, this paper proposed six design strategies to improve the emotional durability of visual communication design, namely, Enjoyment, Functionality, Narrativity, Symbolism, Interaction, and Innovation. In the area of sustainability, the design strategies proposed in this paper provide a new design mode for emotionally durable visual communication design and make products to be more acceptable to consumers and long-term holding. Emotionally durable visual communication design can influence consumers' aesthetics and lead consumers' behavior toward more sustainable use of products.

Keywords: sustainability; sustainable design; emotionally durable design; visual communication design; design strategy



Citation: Ji, S.; Lin, P.-S. Aesthetics of Sustainability: Research on the Design Strategies for Emotionally Durable Visual Communication Design. *Sustainability* **2022**, *14*, 4649. <https://doi.org/10.3390/su14084649>

Academic Editors: Santosh Jagtap and Lucia Corsini

Received: 26 January 2022

Accepted: 12 April 2022

Published: 13 April 2022

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1. Introduction

People may discard items that can still work for various reasons, but only a few people feel that the service life of these discarded items should last longer [1–3]. According to past data analysis, the life of discarded items was approximately two-thirds of their reasonable service life. For small electrical appliances specifically, their service life was roughly five years shorter than their reasonable life [3]. From the perspective of sustainability, such a high product turnover rate should be discouraged because it would result in waste and more resource consumption [4]. Even if these discarded items were made from degradable or renewable materials, excessive environmental pollution and waste could not be avoided. As concluded from past research, it is found that most people tend to frequently replace their innovative products, such as cell phones and electric appliances [3], since the decorative features of these products are changed every year [5] (p. 86). From the perspective of design, these phenomena can be traced back to the negligence of some designers since they were not profoundly aware of these sustainability issues. To overcome these issues, scholars and designers attempted to find possible and feasible measures both from theoretical and practical aspects to extend the life of products.

The concept of sustainable development originates from a report titled “Our Common Future” published by the World Commission on Environment and Development in 1987. It was defined in the report that “sustainable development” should “ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs” [6] (p. 8). As Ben Highmore said, it was acknowledged that global warming and climate change were partially resulted from various design processes, design values, and design products [7] (p. 1). In the second half of the 20th century, Victor Papanek linked design with the environment for the first time, which criticized the design industry at that time and put forward the opinion that designers should take responsibility for the ecology and society [5]. Furthermore, the Green design [8,9], the Ecodesign [10–12], and other design concepts aiming at reducing the impact of products on the ecological environment through design were proposed subsequently. Though the Green design and the Ecodesign paid attention to the effects of products on the environment, they lost sight of society-dimensional sustainability. As a result, they did not significantly affect environmental improvement [13,14]. In April 2009, The Society of Graphic Designers of Canada (GDC) gave a specific definition of “sustainable communication design” for the first time at its annual conference. That is, “sustainable communication design is the application of sustainable principles to communication design practice. Practitioners consider the full life cycle of products and services, and commit to strategies, processes and materials that value environmental, cultural, social and economic responsibility [15]”. The proposal of this definition indicates that the concept of sustainability has begun to be developed in the field of visual communication design, and the role of visual communication designers in society would change significantly. On the other hand, it also reveals that visual communication designers still do not have a clear solution to the problem of sustainability.

In 2015, the United Nations General Assembly (UNGA) established 17 Sustainable Development Goals (SDGs) [16], which remind designers that they are expected to make contributions to sustainability in social, environmental, economic, and cultural dimensions. Afterward, the World Design Organization (WDO), the World Packaging Organization (WPO), the International Council of Design (ICoD), the Society of Graphic Designers of Canada, the American Institute of Graphic Arts (AIGA), the British Fashion Council (BFC), the Council of Fashion Designers of America (CFDA), the Industrial Designers Society of America (IDSA), and other international design organizations gave more specific explanations to the goal of sustainable design through design practices, design competition, design forum, and other design activities.

With the goal of sustainable design being continuously embodied, the design industry has gradually paid more and more attention to consumers’ behavior [17–20], the interaction between consumers and products [21], healthy lifestyle [22], and other aspects in addition to the ecological environment. As a response to sustainability issues in the design theory and design practices, sustainable design is implemented, which reduces the negative impact of products on the economy, society, culture, and the environment, while the extent to which improves the consumers’ personal responsibility, quality of life, physical and mental health, and the like. These factors were considered as the criteria for sustainable design. Over the past 33 years since the concept of sustainability was put forward, scholars and designers have increasingly applied the concept of sustainable design in different aspects of design research and design practices, such as design innovation on product’s spatial, technological, and social relevance [23–25], the extension of product’s lifecycle [2,4,26–30], simplification of sustainable behavior [31] (pp. 120–121), brand sustainability [10,32–36], sustainable packaging [37–44], and visualization of material sustainability [31] (pp. 26–27).

With the development of sustainable design, scholars realized that emotion plays a fundamental role in various types of design works [29,30,45–48]. Research on emotion-centric sustainable design began in 1999 [49] and was a relatively new but rapidly growing category of sustainable design research. It aimed at integrating salient themes of emotional experience into the design industry. Research on emotion-centric sustainable design covers several subcategories of sustainable design, such as material culture design [50,51], product

design [4,26,29,30,45,50,52–58], brand marketing design [59–61], consumer experience centred design [46,62–65], costume design [66–68], etc. It was commonly found that when people assign specific values to products for emotional reasons, they would use these products more carefully because they expect to keep these products for a longer period. For instance, people may get a product repaired when it is damaged, or use it more carefully so that the product is less likely to be damaged. Past research found that this emotional connection between consumers and products can be achieved through a sustainable design approach called the “emotionally durable design”. It means products are designed to increase the durability of the relationships between consumers and products, to extend the life cycle of products, and further reduce the consumption and waste of natural resources [29,30,45,52]. In the research and practices of emotionally durable design, most scholars and designers focused on the product design itself, such as the product’s material, shape, and user experience. However, most scholars and designers have neglected that people’s visual impression of the product greatly impacts people’s judgment of this product [48,69].

A significant recent research result of including emotional durability into product design practices is the emotionally durable design framework proposed by Haines-Gadd, Chapman, Lloyd, Mason, and Aliakseyeu in 2018 [45]. This design framework specifically includes nine subjects, representing nine design factors that designers need to pay attention to in design practice, including Relationships, Narratives, Identity, Imagination, Conversations, Consciousness, Integrity, Materiality, and Evolvability [45] (pp. 14–15). Furthermore, Chapman [29,30], Burcikova [67], Van Krieken et al. [52], Haug [26], Schifferstein et al. [4], Richins [53], Kleine et al. [54], Mugge et al. [28], Agost et al. [70], Csikszentmihalyi et al. [50], Wu et al. [71], BERG et al. [72], Huang et al. [73], Seva [74], and other scholars also proposed design strategies that can guide designers to apply the concept of emotional durability in product design and clothing design practices. In fact, consumers would judge some unique features of a product, such as physical durability, spiritual attributes, and symbolism, by its appearance. Therefore, research on visual communication design should not be related to the aesthetic aspect only. However, research that links emotional durability with visual attributes was rarely reported. Only a few scholars, such as Schifferstein [4], Cupchik [75], Haug [26], Mugge [28], Walker [69], McDonagh [76], and Norman [77] et al., included the appearance in the contributing factors of emotional attachment and believed that visual sensory experience could affect the level of emotional attachment. Hence, it is found that past research seldomly focused on the relationship between emotionally durable design and visual communication design, which leads to the research topic of this paper.

This paper will focus on enhancing the emotional durability of products before use through visual communication design. It is believed that the emotionally durable visual communication design can be construed as an interpretive design. In other words, designers tend to analyze consumers’ emotions including their personal experiences, moods, and desires and attempt to convey them accurately. Through literature review, analysis of past visual communication design practices, and investigation of the consumer market, this paper will put forward a set of design strategies for visual communication design and discuss the potential impacts of these design strategies on visual communication design practices. This set of design strategies comprises six parts, namely, enjoyment, functionality, narrativity, symbolism, interaction, and innovation. These strategies will guide designers to strengthen consumers’ emotional attachment to products through design, achieve sustainable use of products, and reduce waste and unnecessary consumption.

2. Methodology

This paper aims at establishing a set of design strategies to assist designers in improving the emotional durability of their visual communication design works. At present, the methods for the research on the relationship between products and emotional attachment mostly rely on questionnaires. Research by Niinimäki et al. pointed out that questionnaires can collect consumers’ responses, but they were far from enough to gain insights into the

details of consumers' emotional changes [78]. Alternatively, Gupchik proposed a formula to analyze the origin of emotion, which is, "COGNITIVE MEANING + AROUSAL = EMOTION". It combined British empiricism and behaviorism [75] showing that a composite research method may be a better choice. In addition, Chapman [29,30,79,80], Haug [26], Norman [77], Wu et al. [71], Van Krieken et al. [52], Desmet et al. [49], Ceschin et al. [23], Haines-Gadd et al. [45], Cupchik [75], Tseng et al. [81], Fossdal et al. [82], and Saraiva [83], also adopted qualitative research methods to study the emotionally durable design. The complex relationship between consumers and designed products became easy to understand in their works. Therefore, a composite qualitative research method consisting of literature review, case studies, and behavior analysis will be used to establish emotionally durable visual communication design strategies in terms of design theories, design practices, and consumers' emotional experiences. Figure 1 shows the research methods and processes adopted in this paper.

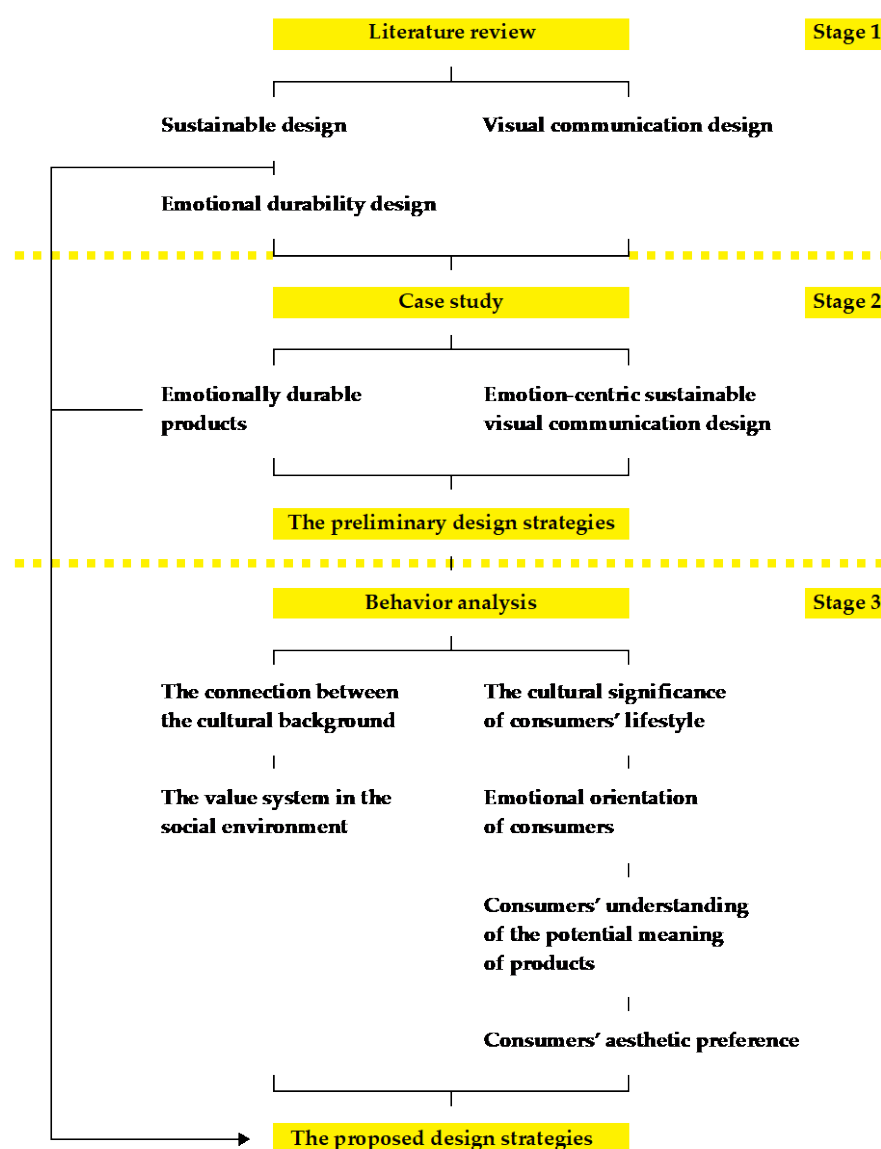


Figure 1. Research methods and processes.

Firstly, this paper reviews literature related to the sustainable design theory, emotionally durable design theory, and visual communication design theory. This part of the work has three emphases. The first emphasis aims to understand the internal driving factors of consumers' emotional attachment to products and how these factors affect them. Special

attention will be paid to distinguishing these factors according to the persistence of consumers' emotional responses. The second emphasis is to determine which design methods can be used by designers to increase consumers' emotional attachment to products at the theoretical level, and to judge whether these design methods can be selected according to different design demands. The third emphasis is to analyze those proposed design strategies by studying their targeting practical problems and find out whether there are research gaps.

Secondly, this paper adopts the case study method to analyze more than 85 high-quality design practice cases. The research content concerning design practices includes an analysis of design practices on emotionally durable products and emotion-centric sustainable visual communication design practices. It should be noted that the visual communication design practices stated here involve the design of product shapes, materials, colors, semiotics meaning of packages, the visual image of brands, product advertisements, online shopping interfaces, and forms of showcasing in stores. There are three emphases in this part of the research. The authors firstly put weight on analyzing practical design cases of daily necessities to understand how designers give new meanings to these products. The second aim is to analyze similarities and differences between the design methods used in design cases and those proposed in theories. By combining the results of the above two research emphases, the authors thirdly propose preliminary design strategies. These preliminary design strategies will be refined afterward, and the analysis results of case studies will be one of the bases to verify the feasibility of these design strategies.

Thirdly, this paper uses the behavior research method to analyze the consumer behaviour described in these preliminary design strategies. As stated by Nigel Whiteley, the research on culture is also the research on design because the study of culture helps scholars to examine design on the basis of social and cultural context [84]. In specific, the research work in this paper focuses on the connection between the cultural background and emotional orientation of consumers, the cultural significance of consumers' lifestyle, the value system in the social environment, consumers' understanding of the potential meanings of products, consumers' aesthetic preference, etc.

Finally, this paper integrates the research results of the three parts mentioned above to improve design strategies.

3. Establishment of Design Strategies

Visual communication designers play essential roles in controlling the deterioration of the ecological environment. Once their design works are put into mass production, the outcome of their impacts on social culture and the ecological environment is fixed [31] (p. 27). As the visual communication design industry pays more and more attention to sustainability, designers are expected to consider how to enhance the sustainability of products during the entire consumption process [29]. It should be clearly stressed that the term "consumption" refers not only to purchase behaviour but also to the formulation of routines and rituals for using products or services. Consumers may make specific modifications to some attributes of the products, which involve selection, purchasing, using, maintenance, repairing, disposal, and recycling of any product or service. The design strategies proposed in this paper are developed in the context of research on visual communication design. They will focus on guiding design to help consumers fulfill needs without consuming additional resources while satisfying their needs.

Past research demonstrated that emotional attachment is correlated with self-extension. Specifically, when people think that a product is irreplaceable emotionally, they may regard it as an integral part of themselves [4,54,85–88]. Greenwald once proposed that people's self-schema may be classified into four aspects: the diffuse self, the private self, the public self, and the collective self [89]. It was similar to Jordan's four-type pleasures theory: physio-pleasure, psycho-pleasure, socio-pleasure, and ideo-pleasure [58]. These two theories provide this paper with variables that can influence the degree of people's emotional attachment to products. This paper proposes a design strategy system composed

of six design strategies. As consumers' emotional attachment to different types of products may vary, each strategy contains two or three more supplementary strategies to guide designers in a more precise manner in practices. Table 1 lists the six design strategies and their supplements proposed in this paper.

To more intuitively show the implementation ability of these design strategies, several examples of good design practices relevant to each design strategy are listed in the third column of Table 1. Guided by any individual or a combination of these design strategies, visual communication design is expected to develop towards a more emotionally durable direction and trigger the potential for more sustainable use of products. Figure 2 shows the relationship between six design strategies and the fourteen corresponding supplements. In the following paragraphs, each design strategy will be specifically explained. The effects these design strategies may pose or have posed on visual communication design practices will be discussed.

Table 1. Design strategies for emotionally durable visual communication design.

Design Strategies	Supplements	Design Cases
1. Enjoyment [4,26,49,58,71,73,74,90]	1a. Indicates the pleasure of the product in use [4,68,90–93].	• Rooster Teapot (Michael Graves) • “Ready to be loved again” (M&C Saatchi) • News of the Woolled Introduction to Knitting (Gwyn M. Lewis) • Emotional Lighting (UMID) • The “B-set” (Hella Jongerius) • Humidifier (Kenya Hara) • Smile Stool (Jaime Hayon)
	1b. Provide consumers with interesting and unexpected interactions and discoveries during use [29,71,72,74,94,95].	• Google Doodles (Google Doodlers) • Humidifier H5 (Second White) • Mental-Soothing Device (Shin Chen, Hongting Ye) • Humidifier (Kenya Hara)
2. Functionality [4,26,27,49,71]	2a. Show the practical functions of products and reflect their reliable quality [4,49,52,71,96–98].	• Apple Ads (Apple) • “Ready to be loved again” (M&C Saatchi) • HANDVÄRK Mantle (Iskos-Berlin) • Umeda Hospital signage system (Kenya Hara, Yukie Inoue, Taichiro Takeo, Nozomi Morisada)
	2b. Show products' real and specific functions [29,30,45,49,98,99].	• The sustainability scorecard (Celery Design) • Harman Kardon SoundSticks (Harman Kardon) • People People Wireless Transparent Speaker • “Bunaco” (Nendo)
3. Narrativity [4,30,45,71,73]	3a. Show that products can be used as gifts for holidays, anniversaries, and other special days [4,30,45,54,73,74,100].	• “Ready to be loved again” (M&C Saatchi) • Starbucks' Holiday Cup (Starbucks) • Lego Brick Headz Valentine's Puppy Building Kit (Lego)
	3b. Create a nostalgic or retro feeling with a visual image that can reflect the past [52,71,81,101,102].	• Marshall speakers (Marshall) • Volkswagen New Beetle • Beyond Retro Label (Beyond Retro) • Woo-bi desk lamp (Jaekyoung Oh) • Gravity Controlled Clock (Stylepie) • Apple Ads (Apple) • New Chinese Toys (Made in Nature) • New Chinese Goods (Made in Nature) • MINI Cooper (BMW) • MUJI wall-mounted CD Player (Naoto Fukasawa) • Mom'n Baby (Matthieu Manche) • ReCoil (Brodie Neill)

Table 1. Cont.

Design Strategies	Supplements	Design Cases
	3c. Tell an interesting and continuous story [29,45,52,72,81,103].	• PUMA shoes (Emma Whiting) • Stain tablecloth (Seb Oddi) • “Stain” teacups (Bethan Laura Wood) • The “Hawley side table” (The Egg Collective)
4. Symbolism [26,27,52,104]	4a. Symbolize personal or social identities that consumers expect, and promote consumers’ self-identification or a sense of belonging to their social groups [4,26,27,52–54,58,68,71,73,100,105–107].	• “I’m Not A Plastic Bag” (Anya Hindmarch) • GOGO Lamp (Wang Chih Hung) • Adidas football shirt (Adidas) • Brooks Green Silence (Brooks) • “I Am A Plastic Bag” (Anya Hindmarch) • “World’s first paper razor” (Kai)
	4b. Embody the symbolism of cultural value [26,27,73,74,108,109].	• Helvetica typeface (Eduard Hoffmann) • “I Love NY” logo (Milton Glaser) • Hyouri (Nendo) • Vlisco Recycled Carpet (Vlisco) • New Chinese Toys (Made in Nature) • New Chinese Goods (Made in Nature)
5. Interaction [45,49,52]	5a. Create interesting interactions between consumers and products and between consumers [29,45,49].	• Pig line ball (LU YU) • Agrafeuse Bleu-Vert (Papier Tigre) • Non-temporary ceramics (Hella Jongerius) • News of the Woolled Introduction To Knitting (Gwyn M. Lewis) • Gel Remote Control (Panasonic Design Company) • Tadpole Coasters (Shin Sobue) • High Five with a Hand from the Future—Gel Doorknob (Toyo Ito) • Mom’n Baby (Matthieu Manche) • 800 dots—Paperback Cover (Masayo Ave) • Hyouri (Nendo)
	5b. Enable consumers to reflect interactivity by assigning products with personality [29,45,52,57,70,110–113].	• “Swatch X You” (Swatch) • MUJI Jute My Bag (MUJI) • Lego • Pandora Charm Bracelets (Pandora) • Oroog • Apple iPhone 13 (Apple) • Puzzleware (Almaborealis)
6. Innovation [67,74]	6a. Create new usage routines, rituals, and experiences for products (or services), and modify some attributes of products specifically or symbolically [45,110,114,115].	• The Juicy Salif Lemon Squeezer (Phillippe Starck) • Humidifier H5 (Second White) • Interface’s leasing model (Interface) • News of the Woolled Introduction to Knitting (Gwyn M. Lewis) • Refillable bottles (Emanuele Pizzolorusso)
	6b. Create more uses for the products without additional components [45,55,78,98,100,116].	• “Foldschool” (Nicola Enrico Stäubli) • Jingle Bank (Hellen Lee) • Peppa Pig Milk Cookies • “Signature” (Butter by Nadia) • Origami Wrap (Ilovehandles) • Eco Warrior Bag (Rezon) • Straws (Benjamin Hubert) • Lucirmás: pure bottle (Lucia Bruni)
	6c. Leave room for design innovation [29,45,117,118].	• Swatch • LIFEWTR’s Art Beyond Borders series (Athier, Ebtisam Abdulaziz, Basmah) • Rodin Mermaid Collection (Donald Robertson) • Harry’s Razors (Tom Dixon) • Lego’s “House of Dots” (Camille Walala) • HONOR Magic Watch 2 (Jacky Tsai, George Greaves, Wang DongLing, Giovanni Ozzola) • Louis Vuitton Masters Collection (Louis Vuitton)

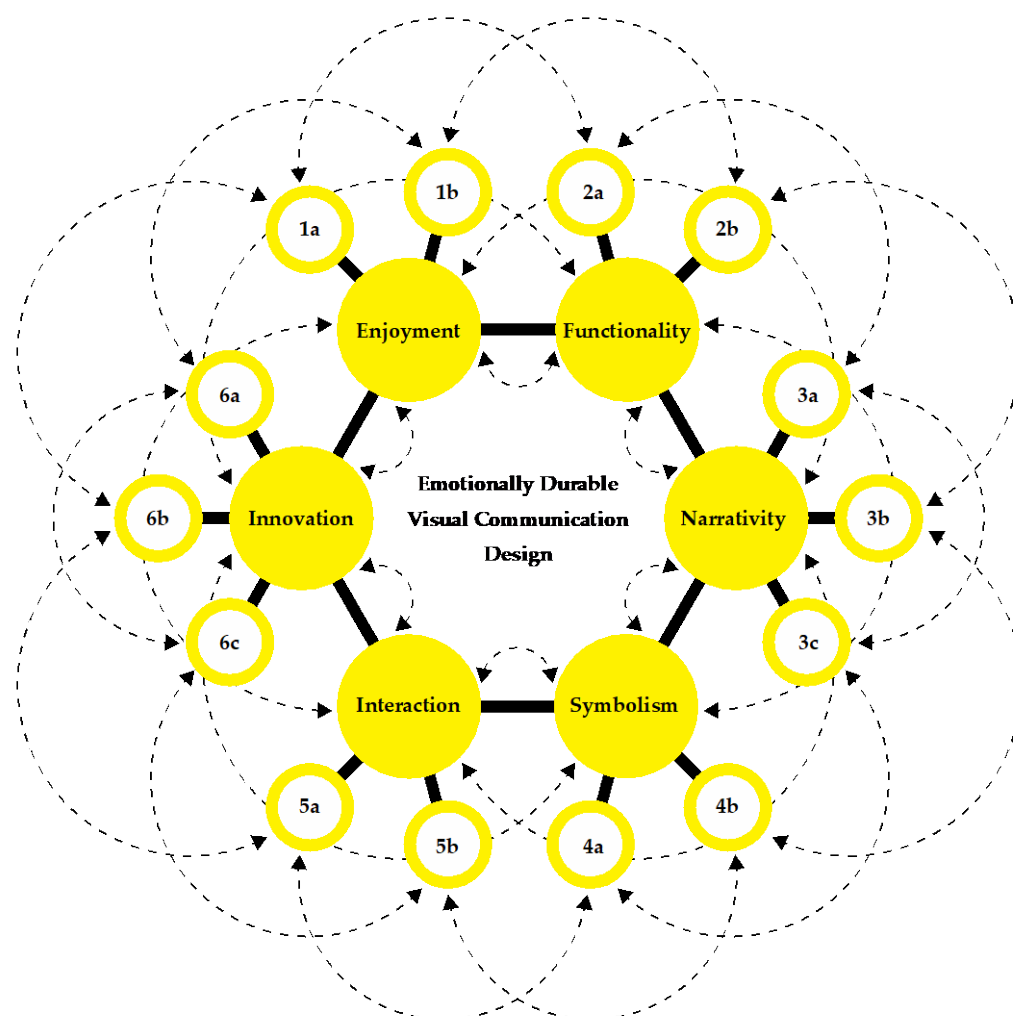


Figure 2. Design strategies for emotionally durable visual communication design (Source: Drawing in this study).

3.1. Enjoyment

The “enjoyment” design strategy [4,26,49,58,71,73,74,90] is proposed to improve consumers’ attachment to the products by enhancing the consumers’ enjoyment before or during the use of products through design. Past research shows that consumers’ emotions toward products may already exist before purchasing these products [4,29,119,120]. Before consumers plan to purchase the product, they may have established a certain connection with the product through advertisements, window showcasing, web pages, and other channels. In addition, when consumers cannot afford the desired product, they may fantasize many times about owning the product or using the product. Therefore, the first supplement (1a) reminds designers to focus on enhancing consumers’ emotional attachment before the product is purchased and extend the emotional attachment as long as possible after the product is purchased [4,68,90–93]. Specifically, designers can improve products’ appearance, color, advertising, packaging, exhibition, website, and other aspects of aesthetic design, or can strengthen consumers’ loyalty to a brand by presenting its core values. Norman criticized the Rooster Teapot designed by Michael Graves as he thought that this teapot was showy and useful. However, he was immediately rebutted by a consumer who owned this teapot, who said, “Every time when I wake up in the morning and stumble across the kitchen to make my cup of tea, it always makes me smile.” [77] (p. 7). It is clear that an aesthetic appearance can indeed make consumers feel attached to the product and affect their behavior. In addition, other design works such as the Smile

Stool designed by Jaime Hayon, the Humidifier designed by Kenya Hara, and the “B-set” designed by Hella Jongerius also follow the Enjoyment (1a) design strategy.

As the “enjoyment” design strategy highlights the “private self” aspect of the self-schema, it embodies the pursuit of “psycho-pleasure”. The second supplementary strategy (1b) reminds designers to take on the role of consumers, to pay attention to the potential delicate emotional needs and changes of consumers in the process of use, and to include interesting interactions or discoveries, that are not available in other similar competing products, during using the product [29,71,72,74,94,95]. Thus, consumers can form a more profound attachment to the product by applying these two supplements [121]. In Norman’s research, the product experiences from more than 150 netizens were collected. One of the netizens said that he had a commemorative cup, and this cup was beautiful in appearance, and its decoration could only be seen when the cup was filled with hot drinks (the cup is covered with a layer of thermal glaze), and the user can perceive if the coffee becomes cool at a glance. So, he loved it very much and used it as his special coffee cup [77] (p. 216). Most products cannot maintain an enduring relationship with consumers [29] (p. 20), but the statement of this netizen indicates that he enjoyed the interesting interactions while using the cup due to its unique visual design. The relationship between him and the product became more intimate.

The Second White is a Korean design studio dedicated to designing daily essentials. In 2019, the Second White designed a humidifier named “Humidifier H5” which integrated the Enjoyment (1b) and the Innovation (6a) design strategy. As the Second White stated, everyone has fond memories of sunrises and sunsets. Therefore, this studio combined the functions of the humidifier with the image of sunrise and sunset, so that consumers can recall his/her emotions, such as anticipation, hope, excitement and calm, while using the humidifier [122]. In addition, the sun-shaped steam nozzle in the humidifier was designed to be removable, which allows consumers to place it in any containers filled with water. Humidifiers with such a design improve the humidification function of the humidifier and strengthen the concept of sunrise and sunset. With the increase in the times the humidifier is used, emotions experienced by consumers in the process of using the humidifier will be repeated and strengthened. These emotions are not short-term or reflexive, but stable and durable. Similar examples are available, such as the Mental-Soothing Device designed by Sin Chen and Hongting Ye, and the Humidifier designed by Kenya Hara.

3.2. Functionality

The “functionality” design strategy [4,26,27,49,71] reminds designers to show consumers the real and practical functions of products, thus strengthening consumers’ trust, and heightening consumers’ attachment to the product. This design strategy is proposed in a realistic context that the contemporary economic system works based on rapid product replacement and plans for obsolescence [78]. In other words, production and consumption are generally in an unsustainable state, that is, low product price tempts consumers to make fast and unsustainable consumption, and most products are not designed for durable use. However, by tracing back to the origin of design history, we can easily find that the original intention of product design is to achieve durability, ease of use and easy mass production [57,108–121,123–125]. Therefore, the first supplementary strategy (2a) is proposed to remind designers to show the reliable quality of products by presenting their practical functions through visual communication design [4,49,52,71,96–98]. For example, designers can design advertisements and packages to show that the product can be used by several generations [45].

A typical practical design case that follows the Functionality design strategy is the Umeda Hospital signage system designed by Kenya Hara, Yukie Inoue, Taichiro Takeo and Nozomi Morisada. Kenya Hara et al. deliberately chose white cotton cloth as the material for the hospital’s guidance system, though most designers would commonly choose the acrylic plate, foundry resin, photopolymer, and other materials which are resistant to dirt but not environmentally friendly. All information is printed on white cotton cloth, which

is secured to the corner of stairs, roof, and other display areas with supports. The white cotton cloth, which is easy to disassemble and not resistant to dirt, shows patients that the hospital is clean and committed to the strictest standards of hygiene at all times.

The second supplementary strategy (2b) is proposed to advise designers to present the functions of products in detail by visual communication design to gain consumers' trust [29,30,45,98,99]. It is necessary to have a detailed product description [98] that acts as an essential "intermediary" role in helping people understand and use the product in an ideal way as predefined by designers. At present, many design works can provide consumers with a clear and intuitive understanding of products by visually displaying the internal structure of products. The transparency of products is increased in terms of physical information presented.

For example, the Harman Kardon SoundSticks and the People people Wireless Transparent Speaker with visible internal structures, a watch with a transparent dial, a glass steamer, a sustainable scorecard [31] (p. 27), a toothbrush with its service life specified on the package, and a printer with double-sided copying function indicated on its body, and so on. The above-mentioned design works enhance the participation of consumers in the use process and strengthen the trust of consumers in the products through special visual communication design. It should be noted that as an excessive emphasis on the physical durability of a product can easily weaken people's attachment to the product [97], the "functionality" design strategy should serve as a basic strategy combined with other design strategies.

3.3. Narrativity

The "narrativity" design strategy [4,30,45,71,73,105] aims at strengthening consumers' attachment to the products by telling stories between the products and the consumers via design. With the first supplementary strategy (3a) in mind, designers are expected to guide consumers to obtain products in specific manners attachment is more likely to develop. For example, products can be given as gifts for holidays, anniversaries, and special days [4,30,45,54,73,74,100]. The memory of the first contact with the product affects a consumer's initial feeling about the product, and may further affect the mood during owning the product [4] (p. 4). When products are obtained as gifts, people may transfer their emotions and memories on givers to the products [126]—even if these products undergo degraded functions, faded appearance, and obsolete techniques during use, users may still prefer to repair rather than to discard the products. For example, the bone china tea sets as wedding gifts are usually properly preserved and are always packaged as holiday gifts that are more likely to be purchased. During the use of these products, the status of "gift" endows products with the power of developing attachment, thus making products more acceptable and even highly tolerable to consumers. When the first supplement of the "narrativity" strategy is combined with the first supplementary strategy of the "enjoyment" design strategy, it will provide consumers with a deeper and more provocative emotional experience due to the combination of visual impact and rich content brought by design.

For instance, M&C Saatchi Group combined narrativity (3a), enjoyment (1a), and functionality (2a) in design practice. It made a propaganda poster for the Christmas campaign "Ready to Be Loved Again" jointly launched by H&T Pawnbrokers and M&C Saatchi. It encourages people to give second-hand jewelry that can be used by generations as Christmas gifts to friends and relatives. As Cindy McCooey, the director of marketing at H&T Pawnbrokers, said, "We know that pre-loved gifts have grown in popularity in recent times, with more and more people choosing to buy sustainably and looking for gifts that can't be found elsewhere on the high street. This campaign taps into this trend and highlights the benefits of buying pre-loved jewellery as a unique Gift" [127]. This advertisement made people realize that buying gifts from pawnshops could be unique and romantic. People could be fascinated by the way they buy gifts and the presents obtained through such a unique route. Besides this, the Starbucks' Holiday Cup and the

Lego BrickHeadz Valentine's Puppy Building Kit are two typical design cases considering the Narrativity (3a) design strategy.

With the second supplementary strategy (3b) in mind, designers are expected to create a feeling of nostalgia or retro [52,71,101,102] by employing visual images that reflect the past. Past research findings show that nostalgic design provides aesthetic and emotional appeal and induces consumers to develop complicated mixed emotions such as warmth, happiness, historical emotions, longing, sadness, and comfort. Consumers' satisfaction with products thus can be significantly improved [128–133]. Designers may provide tangible metaphors to evoke the consumers' good memories of the old days using some nostalgic decorative patterns, shapes, materials, slogans, colors, and display methods through brand visual images, advertisements, packages, exhibitions, etc.

For example, the MINI Cooper car launched by BMW in 2001 was actually a new version of the Morris Mini-Minor car (as shown in Figure 3) designed by Alec Issigonis in 1959. The MINI Cooper retained the original round headlights, uniquely shaped roof, hexagonal grille, angular chassis, and vibrant colors of the Morris Mini-Minor. In addition, the modern materials used in the MINI Cooper, the shape of the instrument panel, and the style of the interior doors also enhanced the retro feel of the car, thus considerably triggering the nostalgia of consumers. Some critics directly suggested that consumers should ignore the disadvantages of MINI [77] (p. 7). Moreover, the New York Times reported in 2002 that: "Whatever one may think of the MINI Cooper's dynamic attributes, which range from very good to marginal, it is fair to say that almost no new vehicle in recent memory has provoked more smiles." [134]. Similar to the MINI Cooper, the Volkswagen New Beetle (appearance and color, etc.), the Woo-bi desk lamp (appearance and color), the Gravity Controlled Clock (shape and color), the MUJI wall-mounted CD Player (appearance and usage), the Apple iPhone (nostalgic advertising, flat interface, etc.), and the Marshall Audio (shape and color, etc.) also adopt nostalgic visual images to win consumers' emotional attachment.



Figure 3. Alec Issigonis photographed at Austin, Longbridge standing next to the first Mini (621AOK) and a new 1965 Morris Mini-Minor Deluxe (Source and Author: Birmingham Museums Trust).

With the third supplementary strategy (3c) in mind, the designers can strengthen consumers' attachment to a product by telling and narrating, interesting and continuous stories with their design works [29,45,52,72,103]. Specifically, designers should maintain the interaction between consumers and products with the help of design as the medium,

and further enrich the relationship between consumers and products through the image narration of visual communication design. For instance, Emma Whiting designed a pair of emotionally durable shoes for PUMA in an attempt to extend the life of the shoe without increasing the production cost. These shoes feature a special coating for printing patterns on the vamp. The traces of wear and dirt on the vamp are no longer a sign of loss of material value, but become the base color of the vamp that highlights the pattern with the elapse of time. The aging process can also strengthen rather than weaken a certain experience [79] (p. 144). These patterns and signs of wear and tear cause consumers to recall stories that happened in the use of shoes, thus increase the uniqueness of shoes, and also enhance consumers' attachment to shoes. The "Stain" teacups designed by Bethan Laura Wood also used the Narrativity (3a) design strategy [135]. The inner surface of "Stain" teacups was specially treated. The more consumers use the cup, the more they scratch and stain the cup, and the clearer the design pattern on the inner surface of the cup will be. As time went on, consumers would own cups that hold memories and fit their drinking styles. Similar examples include the Stain Tablecloth designed by Seb Oddi and the "Hawley Side Table" designed by The Egg Collective.

3.4. Symbolism

The "symbolism" design strategy [26,27,52,104] is to enhance consumers' attachment to products by reflecting the symbolic identity or value expected by consumers through design. With the first supplementary strategy (4a) in mind, designers are advised to exhibit personal or social identities expected by consumers through product appearance design, thus promoting consumers to form a sense of self-identity or belonging to a group [4,26,27,52–54,58,68,71,100,105–107]. People need a sense of belonging and prefer products that symbolize their belonging to a particular group or organization [105] (p. 13). A large number of products in our daily lives that are emotionally and psychologically easier for consumers to use due to the symbolic meaning given by designers. There are several typical examples, such as commemorative football shirts emblazoned with the team's logo (symbolizing that the consumer might be a fan of the team), designer-brand fashion furniture (symbolizing consumers' personal and aesthetic self-identity), a lamp designed to be like a dog (symbolizing the sense of belonging that family brings) [136], cups in International Klein Blue (symbolizing consumers' solitude and pure personalities), shoes made from recycled materials (symbolizing consumers' belief in sustainability), etc.

With the second supplementary strategy (4b) in mind, designers are expected to design products to reflect the symbolism of specific cultural values to strengthen consumers' attachment to the product [26,27,73,74,108,109]. The concept of "self" mentioned in the first supplementary strategy of the "symbolism" design strategy above intrinsically has regional cultural characteristics. However, the concept of "self" emphasizes consumers' relationship to a particular product sample, while the concept of culture focuses on communication. Therefore, this paper deems cultural values as a separate supplementary strategy. With that in mind, designers are expected to pay attention to the emotional attachment brought by the communicative value of the design embodied in cultural exchanges in different regions. For example, the Helvetica typeface (as shown in Figure 4) designed by Eduard Hoffmann for the Swiss market was also widely used in the logos of brands worldwide, symbolizing the company's modernist philosophy [137,138]; The "I Love NY" logo (as shown in Figure 5) designed by Milton Glaser, symbolizing the spread of American visual culture, made people fall in love with New York City again.

A B C D E F G H I J K L M N O P Q
R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v
w x y z
.,:;<-“~`#“”/?!\$%&*+=()[]
1 2 3 4 5 6 7 8 9 0

Figure 4. The Helvetica typeface (Source: Available in personal computer operating systems).



Figure 5. “I Love NY” by Milton Glaser (picture by Museum of Modern Art, Available online: <http://www.moma.org>, accessed on 25 January 2022).

3.5. Interaction

The “interaction” design strategy [45,49,52] is intended to create interactions between consumers and between consumers and products by the mean of design, thereby heightening the consumers’ attachment to products. The first supplementary strategy (5a) suggests that designers should create consumer–product and inter-consumer interactions by adding interest or personality to products [29,45]. Research by Schifferstein et al. proposed that the stimulation of multiple senses could create a more pleasing consumer experience [139]. Therefore, combining vision with other senses may be wise, such as tactility and audition in design. For example, Hella Jongerius’ non-temporary ceramics for Royal Tichelaar Makkum offer consumers various sensory experiences (visual and tactile). Non-temporary ceramics employ irregular half-dipped glaze, presenting both glazed and unglazed states in a single ceramic piece. This design not only assigns unique features to ceramics but

also shows consumers the differences in the process of making ceramics. In addition, this design also encourages consumers to experience the tactile difference between glazed and unglazed ceramics by touching them to increase their interaction with the ceramics.

There are plenty of typical design cases which adopted the Interaction (5a) design strategy. For example, a seasoning jar with mouse whiskers printed on it displays the interesting movement characteristics of mice when vibrating the body of the jar; a cup designed as a fist can “fist bump” with other people when being used; the blade of scissors is designed to resemble the mouth of a crocodile, and when this pair of scissors is being used, it is like a preying crocodile [105] (pp. 154–156). A reel of thread designed as a pig’s nose shape looks like a chubby little pig when it is rolling [140]; a kettle with a smiling face seems to be talking to consumers when it is being used.

Some other interesting design cases integrated the Interaction (5a) with other design strategies. For example, by integrating the Symbolism (4b) and the Interaction (5a) strategies, the Japanese studio Nendo created the Hyouri series of reversible traditional paper Lanterns, which symbolized the traditional culture of Kyoto. Besides, its reversible bamboo frame allows it to be flexibly changed by consumers, which increases the fun of interaction with consumers. Another example is the “Mom ‘n Baby” socket designed by Matthieu Manche who is a French designer living in Tokyo, Japan. He integrated the Interaction (5a) and the Narrativity (3b). The shape of the socket is like a baby just coming out from his/her mother’s stomach, and its irregular shape is also reminiscent of the scene of cell division and reproduction. In terms of materials, Manche used a prosthetic material that was often used to fill in missing parts of the human body. The Mom ‘n Baby socket brings back memories of childhood and mother, and its special material provides consumers with a tactile experience that is different from other similar products.

With the second supplementary strategy (5b) in mind, the designers are expected to improve interaction by promoting consumers to assign their personalities to products [29,45,52,57,110–113]. Scholars found that consumers’ emotional attachment to a product will be enhanced when they personalize it [105,141,142]. Consumers are increasingly provided with opportunities to design their own products. For example, Swatch launched the “Swatch X You” service, allowing consumers to design and create their own unique Swatch watches under the inspiration of art and culture [143]. In the DIY process of Swatch watches, Swatch ensures the quality of the finished design and the satisfaction of consumers through limited picture selection, and avoids the negative impact of upward comparison among consumers [105,144]. Secondly, Swatch also provides enough creative space for consumers despite the limited selections. In addition to freely and precisely arranging patterns on watch band and dial, the styles and colors of mechanical parts such as pointers and other components can also be selected by consumers themselves, so that consumers can maintain a sense of design autonomy [145,146]. Similarly, the iPhone 13 launched by Apple has five optional colors, which provides consumers with personalized choices. Furthermore, brands such as Lego, Nike, MUJI, Converse, Oroog, Pandora, Louis Vuitton, etc., offer consumers services that enable them to design their own products.

3.6. Innovation

The “innovation” design strategy [67,74] is formulated to strengthen consumers’ attachment to products by creating new using routines, rituals, experiences, and usages of products through design. With the first supplementary strategy (6a) in mind, designers may create new ways of using by modifying some attributes of products, either specifically or symbolically [45,110,114,115]. A typical example reflecting this strategy is the juicy salif lemon squeezer designed by Philippe Starck (as shown in Figure 6). With an elegant and peculiar shape, the lemon squeezer differs from any other similar products in the market in terms of its shape and material. Therefore, its function is completely unrecognizable from its appearance—but consumers are excited, confused, amazed, and full of expectations when they are told that it is a juicer. It goes far beyond what one might expect from a juicer, and makes juicing an everyday activity out of the ordinary. Hence, the rich and

special long-term experience transforms the juicer into something more than just a tool with a juicing function. There was even a rumor that Starck said, “my juicer is not meant to squeeze lemons; it is meant to start conversations” [77] (p. 112) [105] (p. 2).



Figure 6. The Juicy Salif Lemon Squeezer (picture by Niklas Morberg).

The Refillable bottles, designed by an Italian designer named Emanuele Pizzolorusso, were launched in ten cities around the world. The bottle was made of PBA-free plastic, and it had the name of each city printed on one side and the address of each city’s public water dispenser on the other. Consumers were less likely to buy single-use bottled water since they could look for water sources printed on the bottle to refill their bottles while traveling in one of the ten cities. Pizzolorusso increased the use of Refillable bottles through packaging design, so that Refillable bottles could increase consumers’ attachment to the bottle by meeting their demand of looking for public water resources. In addition, Gwyn M. Lewis integrated the Innovation (6a), Enjoyment (1a), and Interaction (5a) design strategies in her design works. She created a fun package for wool yarn named “News of the Woolled Introduction To Knitting”. To attract consumers’ attention and to make them interested in the weaving process, Lewis designed the packaging of wool yarn in the shape of a sheep. The packaging board neatly coiled the twisted strands of wool yarn into a ball, forming the body of the “sheep” and preventing the wool from being soiled. The sheep’s front-back was used to hold the wool in place. As the wool was pulled out and used, the sheep’s body gradually became “slimmer”. Even if consumers may not use the wool, it still could be viewed as a unique piece of art. As the designer said herself, “Each sheep was developing a personality” [147].

With the second supplementary strategy (6b) in mind, designers are expected to reduce the frequency of product replacement through design by creating more uses for

the product without the need for additional components [45,55,78,98,100,116]. Current research shows that the decision to replace a product is a step-by-step process involving a constant assessment process [98]. The factors to be considered include the benefits of obtaining a new product, the cost of replacement, the actual state of the old product, and the time and expense required for replacement. Therefore, it is necessary to create more uses for a product, so that consumers can maintain their expectations for the product during its use and thus maintain their satisfaction with the product during the constant assessment process. There are already many examples of using visual communication design to create more uses for products in the consumer market. For example, the Peppa Pig-themed cookies are very popular among children. When children have finished eating cookies, they can get the Peppa Pig-themed coloring paintings on the back of the package by unpacking the box, so that the box may be kept for use in another way. As a result, it reduces the amount of paper and ink needed to print coloring paintings separately. The Jingle Bank, designed by Hellen Lee, is an unconventional piggy bank designed in the shape of a bell. The piggy bank will jingle if it is shaken and become a fun musical toy when it contains coins [148]. In addition, Nicola Enrico Stäubli designed a series of cardboard furniture called “Foldschool” for children to fold by themselves. Furniture patterns and the folding methods can be downloaded for free online, printed on waste corrugated paper, and folded, cut, and assembled by children on their own [149]. Similar examples include Butter by Nadia’s Signature collection and Lucia Bruni’s Pure Bottle.

The third supplementary strategy (6c) aims at leaving enough room for innovation during design [29,45,117,118]. Past research indicates that adding open or positive space to the design can improve aesthetic enjoyment [150], and also increase the chances of further design [29] (p. 156). With this supplementary strategy in mind, designers should be aware that the initial design can be simple, imperfect, irregular, and rough, which, in return, forces designers to examine the imperfections of the product and explore the unknown aspects to identify or define new design ideas. For example, the basic type of the Swatch is pattern less, leaving room for creative designs that allow artists to create design works on the dial and watchband freely. It is precisely why the interaction between products and designers allows the Swatch always to maintain its vitality and launch some unique models. As an employee of the Swatch said, Swatch is not only a company that makes watches, but also a company that creates emotions [77] (p. 86). There are many other examples of collaboration between brands and designers, such as the Louis Vuitton’s Masters Collection bag, the Harry’s Limited edition Harry’s Men’s Care razor, which is a collaboration between the Harry’s and a British designer named Tom Dixon, the Lego’s “House of Dots” with French designer Camille Walala, the HONOR’s Magic Watch 2 launched with artists and designers, the Art Beyond Borders series launched by LIFEWTR collaborated with three artists, and the Mermaid Collection Cosmetics created by Rodin collaborated with artist Donald Robertson.

4. Conclusions

Six design strategies have been proposed in this paper aiming at helping designers to improve the emotional durability of their visual communication design works, so as to achieve the purpose of sustainable use of products. In the first stage, literature review is carried out to study the theories of sustainable design, emotionally durable design and visual communication design. It could be concluded from past research that consumers would develop emotional attachment to products due to some internal factors, such as the need for self-expression, the desire of in controlling of some special products, the need for pleasure, the need for belonging to a group, the need for self-improvement, and the desire for fresh things. In addition, after classifying and analyzing the design strategies proposed in past research, the authors have found that although each design strategy has clear directivity to the emotional needs of consumers, there are about how to actually satisfy these needs through design. Guided by the reviewing results of the first stage, the authors have analyzed several practical design cases related to emotionally durable

product design and emotion-centred visual communication design. The results of the second stage show that emotionally durable product design practices can be driven by continuous emotional responses, while the emotion-centered visual communication design practices are mostly driven by short-term or reflexive emotional responses. With combining the results of the first and second stages, this study has proposed six preliminary design strategies, including Enjoyment, Functionality, Narrativity, Symbolism, Interaction, and Innovation. Preliminary definitions have been given to all the six design strategies. In the third stage of the study, the consumer behavior involved in each design strategy is examined. The results of this part of the study indicate that there is a gap between designers and consumers in the understanding of sustainable products. In some cases, consumers may not always choose the most sustainable product [37]. Designers should have a better and deeper understanding of consumers' behavior patterns and thus can design products that meet consumers' actual needs. In this study, two or three supplementary strategies are added to each design strategy (a total of 14 supplementary strategies) to make each design strategy more implementable. Any primary design strategy can be applied together with any supplementary strategy freely. Designers should evaluate these strategies that are most effective in improving consumers' emotional durability based on product types, the status of the consumers, and the current state of the consumer market. The following conclusions are drawn through the above mentions research works.

At the practical level, the design strategies proposed in this paper can provide effective guidance to designers during the design process. It also shows the critical role of emotionally durable visual communication design in influencing consumers' behavior. When consumers are willing to choose and to hold a specific product for a long time, the replacement rate of this product will decrease significantly, and the service life of this product will be elongated, thus the environmental pollution due to the production and disposal of such products will be greatly reduced. These design strategies are proposed after comprehensive analysis of sustainable design theory, emotionally durable design theory, visual communication design theory, design cases, and consumer behavior. In addition, these strategies also remind designers that the design process of emotionally durable visual communication design should not follow the traditional pattern. Rather, design aesthetics and emotional durability should be integrated and communicated to the client in the process of communication prior to the design of the project concept. This new design mode can not only achieve new breakthroughs and innovations in the design process, but also affect consumers' emotional attachment to products in the process of consumption, and even affect consumers' future purchase decisions. In general, although consumers tend to choose products they trust or favor, they may not choose the most sustainable products. Therefore, the design strategies can also guide designers to transform consumers' visible but hard-to-express needs into readable and easy-to-understand information in the design process. Such information would be conveyed to consumers, so that sustainable products can be more easily accepted by consumers.

At the theoretical level, this study treats sustainability as a design principle and puts forward a new research perspective to visual communication design. It includes a re-evaluation of the values that visual communication design should convey, and a re-classification of the fields that visual communication design involves. The research in this paper reminds scholars of visual communication design to shift their research focuses from practical benefits of products to spiritual benefits of products. In other words, scholars are expected to explore ways to satisfy consumers' deeper and more meaningful spiritual needs. In the early research of sustainable visual communication design, scholars were committed to improving the degradability and aesthetic competitiveness of packaging materials. However, this strategy may cause a lot of waste when it is used improperly. This is because even if many consumers may buy beautiful and durable products, they may still choose to throw them away in the short term, and all these extra costs will cause more serious pollution to the environment. Although assessing the impact of visual communication design cases on sustainability is more difficult than assessing the influence

of other types of design cases, the findings of this paper strongly support the argument that visual communication design does not only influence consumers' aesthetics, but also change consumers' behavior toward more sustainable use of products. As Walker said, only by endeavoring to make our material culture more meaningful can we expect to contribute more to a sustainable future [27] (p. 31).

The research works in this paper do have limitations, and these limitations could be addressed through future research.

Firstly, in the second stage of this study, it is difficult to quickly identify emotionally durable design cases. It is due to the fact that the search for emotionally durable design cases requires scholars to recall their own experiences in practical design cases as designers or consumers. Therefore, the process of reflection is very important. This process not only provides consumers with better ways to understand products, but also provide designers with suggestions for further development or improvement in the design process. Critical studies on emotionally durable design cases can be further explored as an independent research proposition.

Secondly, in the third stage of this paper, consumers' behaviors related to design strategies are studied, and consumers' feelings and aspirations are taken as the standards for the formulation of design strategies. In the process of the current research, special attention are paid to the change of the emotional relationship between consumers and different products. However, the research in this paper have only involved the purchasing, using and maintenance of products. In future research, the research scope can be extended to product repairation, service and recycling, aiming at increasing the emotional durability of products from the whole consumption process.

Thirdly, this paper adopts the qualitative research method to establish an emotionally durable visual communication design strategy regarding design theories, design practices, and consumers' emotional experiences. The scope of qualitative research involves the research, use and collection of various research materials, including design case studies, summaries of consumer experiences, observation and analysis on products, etc. With the emergence of different problems in the research process, various new research methods have been adopted as the subcategories of the qualitative research, ensuring that researchers can achieve in-depth understanding, thinking and analysis of the materials in their research works. However, the design strategies delivered from the qualitative research method remains flawed. Due to the low reproducibility of the results obtained in the study, the design strategies obtained are not precise and objective enough. In future research, quantitative research is expected to re-examine the design strategies. For example, a questionnaire survey to investigate consumers' responses is expected to more deeply understand how attached they are to different designed products. In addition, extensive surveys on the market response to emotionally durable products are expected to gain a more objective understanding of the design factors that may extend the service life of a product. Quantitative research on design strategies is an ongoing effort. The outcome of this research can be combined with the current ecological environment development situation and consumer market status, to adjust and improve the existing design strategies, so as to ensure that the design strategy has an effective guiding role in the emotionally durable visual communication design.

Finally, the design strategies proposed in this paper aim at maintaining durable emotional connections between consumers and products through visual communication design. However, the impact of the design practice guided by such design strategies on the ecological environment is difficult to estimate precisely. In future research, a new comprehensive evaluation model can be established to specifically measure the actual positive impact of visual communication design practices on the environment. This study can not only systematize the research of visual communication design for emotional durability, but also convey the concept of sustainability to consumers through specific data and provide support for the dissemination of the concept of sustainability.

Author Contributions: Conceptualization, S.J.; methodology, S.J. and P.-S.L.; investigation, S.J. and P.-S.L.; writing—original draft preparatoin, S.J.; writing—review and editing, S.J.; visualization, S.J.; supervision, P.-S.L. Furthermore, S.J. acted as the corresponding author. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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