Aesthetic Appreciation of Products

The Effect of Ideas Underlying Design

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Abstract: Products are known to elicit an aesthetic response, just like artworks. In the field of art, it has been demonstrated that information provided in the form of titles, explanatory texts and artists' statements influences the aesthetic response to artworks. In this paper we test the assumption that, similarly, knowledge of the idea underlying the design of a product, i.e., the reason why the designer created the product in a particular way, affects the aesthetic appreciation of the product. Furthermore, we test if the perceived aesthetic quality of the idea affects that appreciation. Results suggest that knowledge of ideas underlying design does influence the aesthetic appreciation of products and that it does so partly because these ideas elicit an aesthetic response by themselves, which in turn influences the overall aesthetic response to products: the more beautiful an idea is perceived to be, the more beautiful a product is perceived to be in light of this knowledge.

Key words: User experience, Product experience, Product aesthetics, Design aesthetics

1. Introduction

The product presented in Figure 1 might at first glance seem a set of mismatching cards showing tattooed hands, string instruments and religious architecture, among other things. It might not seem particularly beautiful. But what if we learnt that this is a memory game in which pairs of cards are not identical, but feature similar elements of the Dutch and Middle Eastern cultures? What if we learnt that it was designed with the aim of making inhabitants of The Netherlands aware of their similarities instead of their differences? Would we like it better? Would it seem more beautiful?



Figure 1. Cross-Cultural Memory Game by Sara Emami

Learning that Sara Emami's Cross-Cultural Memory Game was conceived as a set of harmonizing rather than clashing cultural images, that it was intended to stimulate social equality, involves gaining knowledge of the idea underlying its design. This kind of knowledge is thought to affect people's response to products [3], particularly their aesthetic response to products [11]. Although this is a provocative idea for design research and practice, let alone marketing, no evidence of it has been offered until now.

This paper reports on two empirical studies examining the effect of knowledge of ideas underlying design on the aesthetic appreciation of products. Based on the premise that people have an aesthetic response to products, Study 1 tests whether such response is influenced by the knowledge of ideas underlying design. Study 2 further tests if this influence can be derived from the fact that, once known, these ideas elicit an aesthetic response by themselves, which in turn affects the overall aesthetic appreciation of products.

Because there is no directly relevant or analogous research in design, the empirical antecedents to this paper are a number of studies conducted in the field of art, which in general have provided evidence that the (aesthetic) response to artworks is affected by information offered to viewers in the form of titles [8, 12, 14, see also 16], explanatory texts [2, 5, 16, 18], and artists' statements [17, see also 5]. Additionally, antecedents to this paper can be found in empirical studies conducted in the field of literature, which have proven that the response to literary texts is affected by readers' knowledge of authorial intentions [10, 15].

2. Study 1

2.1 Method

Participants. A total of 60 bachelor students from the Faculty of Industrial Design Engineering at Delft University of Technology took part in the study in return for 10 euros. There were 20 males and 40 females, with an average age of 20.00 years (SD = 1.70). The students were randomly assigned to a control and an experimental group, while balancing age and gender between the groups.

Design. A 2 by 2 mixed experimental design, specifically a pre-post control design, was used to study the effect of knowledge of ideas underlying design (between-subject variable) on aesthetic appreciation of products (within-subject variable). Aesthetic appreciation of products was measured in no-knowledge and knowledge conditions.

Materials. Fifteen documented projects by former master students of Industrial Design Engineering at Delft University of Technology provided the product pictures and the corresponding explicit ideas used as stimulus material in this study. The selected projects represented a wide range of design domains and product kinds (physical and virtual, static and dynamic, individually conceived as well as systems). They were expected to be unknown to participants and therefore avoid aesthetic preference derived from prior knowledge of the stimuli.

The designers' ideas were uniformed to serve as stimuli. As presented in Table 1, each of the resulting short texts comprised between 35 and 45 words divided in two sentences. The former sentence provided information about the product's properties (e.g. 'This is a memory game in which pairs of cards are not identical, but feature similar elements of the Dutch and Middle Eastern cultures'); while the latter provided information about the designer's ultimate goal (e.g. 'It was designed with the aim of making inhabitants of The Netherlands aware of their similarities instead of their differences'). Pictures comprised both sketches and prototype photographs measuring 10 by 15 centimeters, in either landscape or portrait orientation.

Table 1. List of products and corresponding ideas used as stimuli

Product	Idea underlying the design		
Airmail (Novi Rahman, 2010)	This is a smart phone application that delivers messages to their intended recipients when they arrive at locations specified by the senders. It was designed with the aim of helping people to feel closer to each other.		
Cross-Cultural Memory Game (Sara Emami, 2007)	This is a memory game in which pairs of cards are not identical, but feature similar elements of the Dutch and Middle Eastern cultures. It was designed with the aim of making inhabitants of The Netherlands aware of their similarities instead of their differences.		
De Goedzak (Simon Akkaya, 2009)	This is a partially transparent bag where things that are no longer used, but are still in good condition, can be left on the street for anyone to pick them up. It was designed with the aim of enabling people to be generous towards strangers.		
Feet and Greet (Willem Lysen, 2009)	This is a cover that can be pulled over the train seat to put one's feet up and then removed to offer the seat to a fellow traveler. It was designed with the aim of transforming train travelers' antisocial behavior into a social act.		
KookBord (Merel Pick, 2011)	This is an online application in which meals can be planned and cooked together in a virtual kitchen environment. It was designed with the aim of inspiring people to build a social community by sharing and cooperating with each other.		
Packaging Box (Radoslav Gulekov, 2010)	This is a postal packaging box whose side and bottom panels are biodegradable flowerpots filled with earth and grass. It was designed with the aim of encouraging people to respectfully integrate nature in their daily life.		
Patroon (Asako Takahashi, 2004)	This is a kitchen cupboard where everyday products can be stored in separate compartments according to their exact shapes. It was designed with the aim of helping people appreciate the comfortable predictability of daily household tasks.		
Steentjes (Anna Noyons, 2009)	This is a range of natural maternity products whose bio-based packages can be turned into safe toys. It was designed with the aim of encouraging new parents to build a trustworthy base for raising their child.		
Street Lighting (Robier Hartgring, 2002)	This is a street lighting system that projects different patterns on different roads and city areas. It was designed with the aim of enabling people to find their way home comfortably and safely during nighttime.		
The Iflyer (Karen Zeiner, 2005)	This is a seat-integrated display that shows the planes crossing the current flight path and their destination. It was designed with the aim of enabling flight passengers to experience the freedom of mental traveling within the limited space of an aircraft.		
The Tree of Talents (Femke Heikamp, 2010)	This is a website that allows people to articulate their skills and get in contact with those who are in need of them. It was designed with the aim of making inhabitants of unprivileged neighborhoods see the value of their talents.		
Ticket Game (Chetan K. Shivarama, 2009)	This is a train ticket with a visual puzzle that can only be played while traveling. It was designed with the aim of stimulating train travelers to experience happiness by being focused on the present rather than on the time of arrival to their destination.		
Time-Wrap (Jay Yoon, 2009)	This is a digital display that is integrated to train windows and occasionally shows movie clips of the outside scenery from another season. It was designed with the aim of triggering memories and self-reflection in people.		
Venturi Tunnel (Mark van der Woning, 2002)	This is a bicycle path that submits bikers to something unexpected by either pushing or pulling them suddenly depending on the wind direction. It was designed with the aim of giving neighbors a reason to talk to each other again.		
Water Transport Hub (Eleni Soerjo, 2011)	This is a water transport hub where travelers are not isolated from the surrounding wind, water and sky. It was designed with the aim of making people in Rotterdam feel connected with the environment and rediscover the essence of things.		

A 7-point scale was used to measure aesthetic appreciation of products. Participants were provided with the scale to rate each of the pictured products from 1 ('Not at all') to 7 ('Very much') on the following five items: 'This is a beautiful product', 'This is an attractive product', 'This product is pleasing', 'This product is nice' and 'I like this product'. Five distracter items were included in the scale with the purpose of concealing the aesthetic focus of the study and preventing ratings from being affected by the participants' awareness of it.

With these materials, two questionnaires were created. One questionnaire presented the product pictures only, while the other presented the product pictures after the aforementioned short texts. Both questionnaires instructed participants to rate each of the 15 products, successively presented, on the 7-point scale. The order of presentation of product pictures and scale items was randomized in both questionnaires to prevent order effects.

Procedure. The study was conducted in groups of 4 to 8 participants, in the user labs of the Faculty of Industrial Design Engineering at Delft University of Technology. When entering the labs, participants were taken through a standard procedure to establish their informed consent and were randomly divided into a control and an experimental group. All participants first filled out the 'pictures-only' questionnaire, which took between 20 and 25 minutes. When they all had finished, they were instructed to do a distraction task for 5 minutes with the purpose of preventing clear memorization of the stimuli and the ratings. Following this, the experimental group filled out the 'pictures-texts' questionnaire, which also took between 20 and 25 minutes. All participants were more, which took between 15 and 20 minutes. All participants were paid for their participation at the end. The whole procedure took a maximum of 60 minutes.

2.2 Results and discussion

Composite aesthetic ratings were calculated by averaging the ratings of all scale items. These composite ratings were divided into pre- and post- according to the phase of the study from which they were obtained. Difference ratings were then calculated by subtracting pre-ratings from post-ratings. These difference ratings were divided into experimental and control according to the group of participants to which they belonged. These two sets of difference ratings, which corresponded to knowledge and no-knowledge conditions, were submitted to a t-test.

An independent-samples t-test was conducted to compare aesthetic appreciation of products in no-knowledge and knowledge conditions. There was a significant difference in the (difference) ratings for no-knowledge (M = -0.11, SD = 0.24) and knowledge (M = 0.21, SD = 0.39) conditions; t(58) = 3.85, p < .001. When participants gained knowledge of the ideas underlying the design of products, their aesthetic appreciation of the products increased significantly, as shown in Figure 2.



Figure 2. Mean (difference) aesthetic ratings of products in no-knowledge and knowledge conditions

We suspect that the positive effect on the aesthetic appreciation of products was not caused by the mere knowledge of the ideas presented as stimuli, but by an overall 'positive' aesthetic response elicited by these ideas, which in turn affected the overall aesthetic response to products. This positive aesthetic response to ideas can be understood as a response derived from the perception of a 'positive' aesthetic quality, such as beauty, in them. Thus, we hypothesize that the aesthetic appreciation of products is influenced by the perceived aesthetic quality of ideas underlying design. This hypothesis was tested in Study 2.

3. Study 2

3.1 Method

Participants. A total of 30 fully trained designers from Europe, America and Asia, who held a master degree in industrial design and had work experience in the field, took part in this study voluntarily. There were 12 females and 18 males, with an average age of 32.80 years (SD = 6.80). Design experts were selected as participants considering that expertise in design involves the capacity to perceive the aesthetic quality of the ideas that underlie the design of products, which for simplicity will be referred to as 'beauty' of ideas underlying design.

Design. This study was conceived with the aim of obtaining expert aesthetic ratings that could serve as reliable indicators of the beauty (as defined above) of the ideas used as stimuli in Study 1. Based on these indicators, a subset of data points obtained in Study 1 could be identified and further analyzed to explore the effect of beauty of ideas underlying design on aesthetic appreciation of products.

Materials. The same 15 ideas used as stimuli in Study 1 were used as stimuli in this study. They were expected to be unknown to the experts and thus avoid aesthetic preference derived from prior knowledge of the stimuli.

A 7-point scale, equivalent to the one used in Study 1 to measure aesthetic appreciation of products, was used in this study to obtain a measure of beauty of ideas underlying design. The experts were provided with the scale to rate each of the ideas from 1 ('Not at all') to 7 ('Very much') on the following five items: 'This is a beautiful idea', 'This is an attractive idea', 'This idea is pleasing', 'This idea is nice' and 'I like this idea'. Five distracter items were also included in this scale with the aim of hiding the aesthetic focus of the study and preventing ratings from being affected by the participants' awareness of it.

An online questionnaire was created with these materials. It presented the 15 ideas successively and instructed participants to rate them, one by one, on the aforesaid 7-point scale. In the questionnaire, the order of presentation of texts and scale items was randomized to prevent order effects.

Procedure. The questionnaire was distributed via the Internet and filled out by the experts in their own time. Before instructing experts to rate the ideas, the questionnaire provided them with general information about the study and assured the anonymity of their responses.

3.2 Results and discussion

An aesthetic rating was calculated for each idea by averaging ratings given by all participants on all scale items. The average aesthetic rating was 3.93 (SD = 0.65). Ideas with ratings higher than M + SD were labeled as 'high-beauty' ideas; ideas with ratings lower than M - SD were labeled as 'low-beauty' ideas. These ideas corresponded to four of the products rated in Study 1: two products were associated with high-beauty ideas and another two, with low-beauty ideas. This correspondence provided the criterion to reanalyze the data obtained in that study as follows: difference ratings related to the four products only were submitted to an analysis of variance

(ANOVA) in which knowledge of ideas underlying design (comprising conditions no-knowledge and knowledge) and beauty of ideas underlying design (comprising conditions low-beauty and high-beauty) were considered as factors or independent variables.

A two-way ANOVA was conducted to examine the effect of knowledge of ideas underlying design and beauty of ideas underlying design on aesthetic appreciation of products. The means and standard deviations calculated are presented in Table 2. The analysis revealed significant main effects for both knowledge of ideas underlying design F(1, 236) = 15.37, p < .001 and beauty of ideas underlying design F(1, 236) = 11.71, p = .001; and a significant interaction between the effects of knowledge of ideas underlying design and beauty of ideas underlying design and beauty of ideas underlying design on aesthetic appreciation of products, F(1, 236) = 4.42, p = .037.

Knowledge of ideas underlying design	Beauty of ideas underlying design	М	SD
No-knowledge	Low-beauty	-0.29	0.84
	High-beauty	-0.11	1.02
Knowledge	Low-beauty	-0.05	1.04
	High-beauty	0.69	1.22

Table 2. Means and standard deviations of the (difference) aesthetic ratings of products

These results support the hypothesis that the aesthetic appreciation of products is not simply affected by the knowledge of ideas underlying design, but by the perceived aesthetic quality of such ideas. When participants gained knowledge of ideas with a low degree of beauty, their aesthetic appreciation of products did not increase significantly, as shown by the dashed line in Figure 3. However, when they gained knowledge of ideas with a high degree of beauty, their aesthetic appreciation of products did increase significantly, as shown by the continuous line in the same figure. Thus, only the knowledge of ideas perceived as highly beautiful increases the aesthetic appreciation of products in a significant manner. On this basis, the positive effect found in Study 1 can indeed be interpreted as the result of an overall positive aesthetic response elicited by the ideas used as stimuli, which in general seem to have been perceived as beautiful by the participants.



Figure 3. Mean (difference) aesthetic ratings of products underlaid by high-beauty ideas (continuous line) and products underlaid by low-beauty ideas (dashed line) in no-knowledge and knowledge conditions

4. General discussion

This paper reported two empirical studies testing the effect of knowledge of ideas underlying design on the aesthetic appreciation of products. Study 1 showed a positive effect of knowledge of ideas underlying design on aesthetic appreciation of products. Study 2 provided evidence that only knowledge of ideas ascribed a high degree of beauty caused such effect. The latter results supported the hypothesis that the aesthetic response to products is influenced by the perceived aesthetic quality of ideas underlying design: the more beauty is perceived in an idea, the more beauty is perceived in a product in light of this idea.

Altogether, these findings have an important implication for design aesthetics: they suggest that people do not only respond aesthetically to product properties such as color and shape, but to ideas that transcend those properties and present products as emerging from an intentional process [9], i.e., as *designed* products. Design research and practice should not overlook this 'invisible' side of aesthetics; marketing too can benefit from explicitly treating products as *designed* products, as artifacts in contrast to mere objects [1 based on 13], and taking into account the position people adopt towards products thus conceived [4, see also 19 based on 6].

As well as with relevant findings, the paper leaves us with two major unresolved issues. One of them concerns the alternative possible reasons why knowledge of ideas underlying design might affect the aesthetic appreciation of products. Knowledge of these ideas is certainly a prerequisite for the perception of the ideas' aesthetic quality, which Study 2 found to have an influence on the aesthetic response to products; however, the influential role of such knowledge on aesthetic appreciation of products is likely to go beyond that. This is what the unprompted comment of one of the participants of Study 1 indicates:

'During the first questionnaire, it was sometimes hard to realize/appreciate what you are looking at, while at the second questionnaire, which was the same as the first, except with a description [the idea underlying the design], you realize that you are looking at ideas instead of products... In the first questionnaire, products sometimes scored bad[ly], because the images could not communicate their idea/essence/meaning. The second questionnaire showed the actual idea behind those products, and products which seemed meaningless at the first held a lot more beauty in the second.'

For this participant, gaining knowledge of the ideas underlying the design of products made the products meaningful and such meaningfulness was closely related to beauty. Although the aesthetic experience and the experience of meaning can be conceptually distinguished, they are inseparable aspects of product experience in day-to-day life [7]. Therefore, when participants of Study 1 were instructed and thought to be rating products aesthetically, they might actually have been rating the products in terms of meaningfulness. Future research should further explore why knowledge of ideas underlying design influences the response to products; empirical studies that focus on aesthetics should control for possible confounding variables, such as meaningfulness.

The other major issue this paper leaves unresolved concerns a dimension of the aesthetic response relevant to design. We assumed that there is an aesthetic response to products and proposed that there is also an aesthetic response to ideas underlying design; the latter affects the former according to our findings. But besides these two responses, there is a distinct aesthetic response to the relationship between ideas and products. There is, for instance, an aesthetic response to the relationship between the idea of social equality and a particular memory game, and this response is neither the response to the idea in itself nor the response to the game properties.

As we said, these distinctions between aspects of design experience are clear-cut only conceptually. This means that when participants of Study 1 were instructed and thought to be rating products in the knowledge condition, they might actually have been rating the relationship between products and ideas; and that when participants of Study 2 were instructed and thought to be rating ideas, they might actually have been rating the products they imagined would embody these ideas. Future research should further explore the plurality of aesthetic responses that design might elicit; empirical studies should take into account their possible interaction.

Although in the context of design emphasis is often placed on the aesthetic response to product attributes such as complexity and novelty, these attributes can also describe the ideas that lie behind product design. Moreover, a complex idea can be realized as a simple product and a complex product can embody a simple idea; a novel idea can be realized as a familiar product and a novel product can embody a familiar idea. But what is aesthetically preferred? It is worthwhile exploring the aesthetic response to products in relation to the ideas underlying their design because it is only in light of those ideas that products display their beauty as *designed* products.

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6. References

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