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AESTHETICS VERSUS USABILITY: WHAT DRIVES OUR PRODUCT CHOICES?

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ABSTRACT
This research examined the influence of usability and aesthetic/emotive characteristics on prospective buyers' preferences in pre-purchase product selection. Results indicate that while both characteristics are important, aesthetic/emotive factors are dominant and can counteract negative perceptions of usability-at least in regard to the products studied. This research contributes to our understanding of the relationship between a product's usability and aesthetic factors, and how these are perceived by users at different stages of product selection. Both product design and design education could be improved through a better understanding of users' interactions with products. How users perceive and respond to products, how their responses change over time and with varying levels of contact with the product, and ultimately how user satisfaction emerges from these processes is integral to such improvements.

Keywords: User behaviour, product design

1 INTRODUCTION

What happens when a customer is in the market for a particular product, and is confronted with multiple models, all basically doing the same thing? What makes them choose to buy one version rather than another? Researchers, designers, ergonomists and marketers are all interested in that decision-making process and how to influence it. They all aspire to a common goal: to produce items that lead to overall consumer satisfaction with the product [1], [2], [3], [4].

Researchers from various backgrounds within this multidisciplinary field are contributing converging ideas and sharing knowledge on how best to provide optimum levels of overall product satisfaction. It will be important to maintain the present interest in this field, to ensure that the processes used to develop new products take account of the need for participant feedback on a wide range of issues at several stages during the design process. Only in this way can products be developed which will provide multi-dimensional satisfaction to users, combining good usability with the capacity to evoke aesthetic and emotional pleasure.

As a contribution towards answering these questions, this research examined the influence of a range of perceived product attributes during pre-purchase decision-making. Drawing upon a previously developed conceptual framework for product evaluation, two empirical studies were conducted with a total of 86 participants to gauge perceptions of products' 'usability' and 'aesthetic/emotive' characteristics. Clock radios and cordless kettles were used as examples of domestic electrical appliances with differing levels of user-interface complexity.

2 THEORETICAL FRAMEWORK

2.1 Hypotheses

Three hypotheses were developed to guide this research (see summary Box 1). The first two relate to the initial stage of potential buyers' consideration, when product images are viewed in a catalogue or online (Stage 1). The third relates to the later stage of consideration, when potential buyers can handle, but not use, products in-store (Stage 2).

Stage 1 hypothesis:

1a) aesthetic/emotive influences would be stronger than usability influences when potential buyers express a preference between different models of a simple product on the basis of viewing

images (and that this would be less evident when choosing between models of a more complex product).

1b) when these potential buyers are asked to differentiate between how much they like versus how likely they would be to actually buy a product, the influence of usability factors would become stronger than aesthetic/emotive factors, and this would apply to both simple and complex products. This was suggested to test the idea that actually purchasing a product would be more influenced by practical considerations than by reactions to its appeal. For example, some might *like* a blue kettle because of the unusual colour, but prefer to *buy* a white one in order to tone with an existing kitchen colour scheme.

Stage 2 hypotheses:

2) usability influences will remain stronger than aesthetic/emotive influences in product preferences, and that this would apply to both simple and more complex products.

Box 1: Hypotheses summary

Hypothesis 1:

The influence of a model's aesthetic/emotive characteristics relative to its perceived usability characteristics will be:

(Part A) greater for different models of cordless kettle (a 'simple' product) than for different models of clock radio (a more complex product)

*(Part B) greater when influence is measured in terms of the strength of association between ratings of product characteristics and ratings of how much people **like** each model, rather than for ratings of how likely they would be to **buy** each model.*

Hypothesis 2:

The influence of usability characteristics relative to aesthetic/emotive characteristics will be greater for both products in stage 2 (handling products) than in stage 1 (viewing photos).

2.2 Conceptual model and attributes

The research drew upon two elements of previous work.

The first element of earlier work was a conceptual model for product evaluation developed to explain the genesis of overall product satisfaction [5]. The model highlights interactions between perceived *product characteristics* (such as functionality, usability and aesthetic/emotive characteristics) and *user characteristics* (such as needs, skills and personality) (see Figure 1). These interactions lead to *evaluative responses* which together determine overall product satisfaction: that is, the extent to which a user will like the item, wish to buy it, and continue to use and value it after purchase.

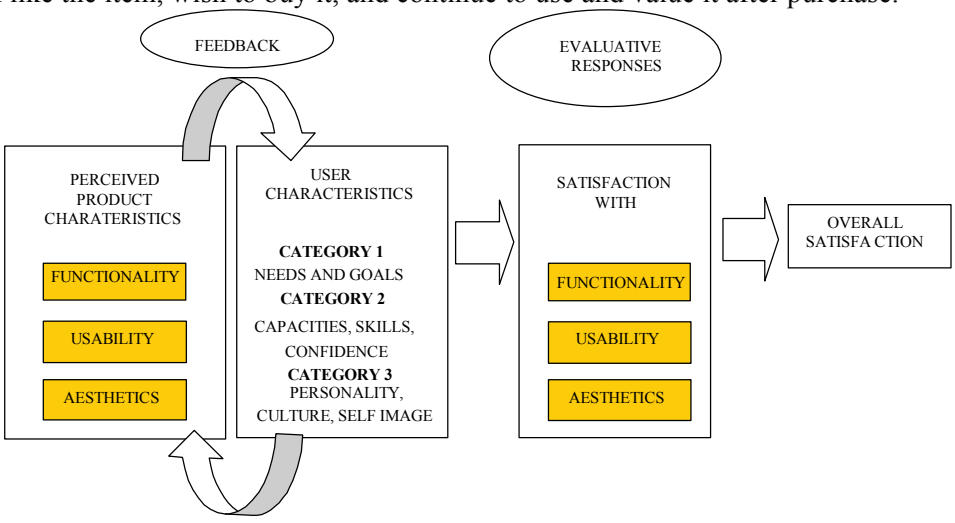

Figure 1. Product evaluation model

Applying the model means that product evaluation criteria should include:

- effectiveness in meeting users' needs and goals;
- efficiency in users' performance (e.g. ease of use, errors and safety)

- impact on users' feelings regarding aesthetic/emotive product factors; and
- overall satisfaction, a combination of the relative importance of the factors above.

The second element was a range of characteristics generated through the use of focus groups relevant to each identified category of product characteristics: functionality, usability and aesthetic/emotive [6].

3 METHOD

For the purposes of this study characteristics generated in the categories of usability and aesthetic/emotive were refined to a matrix of 20 attributes and these were used to design a participant questionnaire. Participants completed the questionnaire to rate products against these 20 attributes and also gave an overall rating against a further two questions: how much they liked, and how likely they would be to buy the product. The research was undertaken in two stages:

- Stage 1 (n=49: 36.7% (18) male and 63.3% (31) female) where participants were able to view images of the products. This stage replicated product assessment where potential buyers view images in a catalogue or online.
- Stage 2 (n- 37: 43.2% (16) male 56.8% (21) female) where participants were able to handle – but not use - actual products. This stage replicated product assessment where potential buyers examine the product in-store.

The products chosen were cordless kettles (typifying a simple appliance with functionality limited to filling, turning on/off and pouring, Figure 2) and clock radios (typifying a more complex appliance with a range of functionalities including setting an alarm, changing radio stations and adjusting the time, Figure 3). Product selection criteria also included: a sufficient range of usability and aesthetic/emotive attributes, an adequate range of models from different manufactures, likelihood of participant familiarity; and cost and portability. Six models of each appliance were studied.

Figure 2. Selected cordless kettles

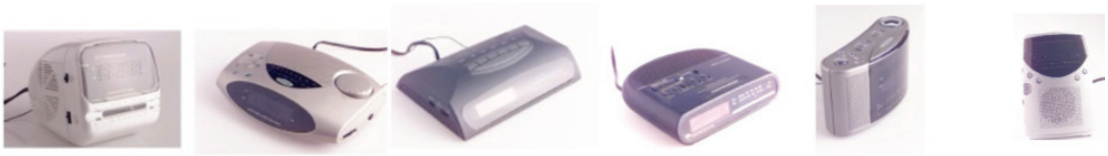

Figure 3. Selected clock radios

Participants were asked to rate each of the six models of the two product types against the 42 questions, resulting in 504 (42 x 12) questions per participant. Order of product type (kettle, radio) and orders of models within each product were balanced over participants, as were orders of the individual items within each questionnaire.

4 DATA ANALYSIS

Participant ratings were subjected to principal components analysis and scores on each factor were used in linear regression analyses for each model and a linear mixed model analyses to determine the extent to which they had a statistically significant influence on overall 'like' and 'buy' ratings. These methods were used to produce two measures of the influence of usability and aesthetic/emotive factors on the overall ratings: mean effect size and mean correlation coefficients. Differences between the two measures were also compared.

5 RESULTS

5.1 Stage 1

As shown in Table 1, the effect of aesthetic/emotive factors was larger than that of usability factors on the overall rankings for both products, whether measured by mean effect size or mean correlation coefficients. For clock radios, usability had a relatively greater influence on both like and buy ratings than it had for kettles. This can be seen by comparing clock radios and kettles in terms of the differences between effect sizes of these two factors. For example, the difference between 0.193 and 0.771 (kettles - like) is greater than that between 0.518 and 0.853 (clock radios - like). Similarly, correlations with 'like' and 'buy' are higher for the aesthetic/emotive than the usability factor, but the difference is less for clock radios (38% and 28% for 'like' and 'buy' respectively), compared with kettles (61% and 55% for 'like' and 'buy' respectively).

Table 1. Relative effects of product attribute factors Stage 1

	Kettles				**Clock radios**			
	Mean effect size		Mean correlation coefficients		Mean effect size		Mean correlation coefficients	
	Like	Buy	Like	Buy	Like	Buy	Like	Buy
Usability factors	0.193	0.218	0.406	0.387	0.518	0.584	0.511	0.551
Aesthetic/emotive factors	0.772	0.800	0.652	0.600	0.853	0.874	0.706	0.705
% difference between factors	300%	267%	61%	55%	65%	50%	38%	28%

Results show the percentage difference between usability and aesthetic/emotive effects is greater – indicating a greater influence of aesthetic/emotive factors relative to usability – for 'like' ratings than for 'buy'.

5.2 Stage 2

As shown in Table 2, results from Stage 2 were similar to Stage 1 in that the effect of aesthetic/emotive factors was larger than that of usability factors on the overall rankings for both products, whether measured by mean effect size or mean correlation coefficients. This effect was greater for aesthetic/emotive factors, as can be seen in the difference in mean 'effect size' between factors for both 'like' and 'buy' ratings. The greater effect of aesthetic/emotive factors on overall product ratings is also evident in the greater magnitude of mean correlations between this factor and both 'like' and 'buy' ratings, compared with the size of correlations for the other two factors.

Table 2. Relative effects of product attribute factors Stage 2

Factors	**Kettles**				**Clock radios**			
	Mean effect size		Mean correlation coefficients		Mean effect size		Mean correlation coefficients	
	Like	Buy	Like	Buy	Like	Buy	Like	Buy
Usability	0.433	0.266	0.519	0.430	0.235	0.316	0.459	0.490
Aesthetic/emotive	0.644	0.793	0.643	0.626	0.689	0.852	0.670	0.709
% difference between factors	49%	198%	24%	46%	193%	44%	46%	45%

5.3 Comparison of Stage 1 and Stage 2 vis a vis hypotheses

Data from both stages are compared in Table 3. In absolute terms, the influence on 'like' and 'buy' ratings of usability was almost always less than that of the aesthetic/emotive factor. Therefore, to investigate hypothesis 2, the relative effect of usability is shown in terms of *how much* greater (in percentage) the aesthetic/emotive influence is, relative to the usability influence. According to hypothesis 2, percentages will decrease for both kettles and clock radios in Stage 2, relative to Stage 1. The second hypothesis, that for both simple and more complex products the influence of usability characteristics would be stronger than aesthetic/emotive characteristics when users were able to handle products (rather than just viewing images), was not supported by the results. Stage 1 results showed usability had a relatively greater influence on both like and buy ratings for clock radios than it had for kettles, but these were not replicated in Stage 2. For example, the differences are 49%, 198%, 193%

and 44%, for kettle like and buy, and clock radios like and buy, respectively (see Table 3). Similarly, correlations with 'like' and 'buy' are higher for aesthetic/emotive than usability factors, and differences are 24%, 46%, 46% and 45% for kettle like and buy, and clock radios 'like' and 'buy' respectively.

Table 3. Comparison of influence of usability and aesthetic/emotive factors Stages 1 and 2

		% difference between factors in effect sizes	% difference between factors in correlation coefficients
		Stage 1	
KETTLES	'like'	300	61
	'buy'	267	55
CLOCK RADIOS	'like'	65	38
	'buy'	50	28
		Stage 2	
KETTLES	'like'	49 - less	24 - less
	'buy'	198 - less	46 - less
CLOCK RADIOS	'like'	193 - more	46 - more
	'buy'	44 - less	45 - more

For kettles, there was some support for the hypothesis that usability would be more influential than aesthetic/emotive characteristics as more interaction with the product was allowed: in all four cases the percentage difference between usability and aesthetic/emotive influence was greater in Stage 2 than in Stage 1. That is usability tended to have relatively more influence on people's evaluation of kettles when they handled the actual products (Stage 2) than when they only saw photographs of them (Stage 1). For clock radios however the hypothesis was unsupported. In three of the four cases the percentage difference between usability and aesthetic/emotive influence was *greater* in Stage 2 than in Stage 1. That is usability tended to have relatively *less* influence on people's evaluation of clock radios when they handled the actual products.

5.4 Caveats

In any study using lengthy questionnaires, motivation levels may vary over the course of questions, with participants possibly skimming some in an attempt to finish earlier. This potential issue was addressed by advising participants of the time commitment in advance, ensuring sufficient time was allowed and creating a relaxed environment in which to respond to the questionnaire. Another potential limitation regarding participant characteristics is the possibility of varying levels of experience with the product types. This risk was reduced by selecting commonly used appliances designed for use by a broad range of users. However if studying more complex products, a specific question regarding participants' levels of experience and knowledge of the product may be useful.

6 DISCUSSION

In both stages, the influence of the aesthetic/emotive characteristics was greater than the influence of usability-related characteristics for both kettles and clock radios. Hypothesis (1a) - that such a difference in influence would be greater for kettles, being a simpler product, than for clock radios, representing a product with a more complex user interface - was supported in Stage 1 but not in Stage 2. Neither stage provided evidence to support hypothesis (1b). That is, aesthetic/emotive influences were stronger than usability influences, even when potential buyers differentiated between how much they liked, versus how likely they would be to actually buy, the product.

Evidence was mixed in relation to hypothesis 2, that is, that usability characteristics would be more influential than aesthetic/emotive characteristics when users are able to handle products than when only able to view images of products, and this would apply to both simple and more complex products. For kettles, there was some support for this hypothesis: that is, usability tended to have relatively more influence on people's evaluation of kettles when they handled the actual products (Stage 2) than when only viewing images (Stage 1). For clock radios, however, the hypothesis was unsupported. The reasons for this are not readily apparent. It had been expected that the greater

complexity of the clock radio user interface would have been more evident to Stage 2 participants, who could handle and inspect the actual products, and that this would have increased the salience of usability-related issues. It was also expected that the comparatively simple cordless kettles might be perceived as being relatively equal in their usability, reducing the influence of this factor for them. One possible explanation for the relatively low influence of usability under the product-user interaction conditions of this study is that participants might have used a more holistic or global approach to form an overall impression of the product, rather than examining and evaluating individual attributes. Such an approach might in fact be encouraged by the perception that a product is relatively complex, to the extent that some may see specific evaluation of its usability as too difficult. It was also expected that usability would be relatively more influential for products with more complex user interface designs, such as clock radios. In such cases, variation in the usability of the interface seems more likely to affect people's capacity to use the product successfully. However, it may be that such effects only become evident after purchase, when people actually (attempt to) use products for their intended purposes.

7 CONCLUSION

This study contributes to our understanding of the influence of aesthetic and usability factors on product selection by quantifying the relative strengths of these associations at different points of pre-purchase production interaction. The fact that some 'common sense' hypotheses were not supported by the evidence highlights the importance of such experimental studies. Future investigation in this area could build upon this work by examining similar product interactions in the post-purchase phase, when the product is actually being used in the real world.

A better understanding of usability and aesthetic factors as key drivers of the user-product interface is of critical importance to the fields of marketing, ergonomics and product design. If these professions had a better understanding of the product evaluation process and how user satisfaction stems from perceptions of product characteristics, products could be better designed and marketed with the user in mind.

Achieving this outcome will require changes to undergraduate and postgraduate education for these professions, based on the identification of areas of potentially shared knowledge. For example, the fields of psychology and behavioural sciences, which underlie so much of the user-product interaction, have in the past largely been inaccessible to most design undergraduates. New platforms for sharing knowledge across such traditional disciplinary silos are now emerging. For example, recent works developing a shared vocabulary to enable cross-discipline communication and articulating the application of behavioural sciences to design [7], [8] are successfully being used in the author's undergraduate design courses. Future developments should build on this base through inter-disciplinary teaching, plain language texts and cross-discipline team projects.

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