

# VISUALIZING GREEN - PRODUCT SEMANTICS AS MEANS OF ENVIRONMENTAL COMMUNICATION

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## ABSTRACT

Products can be used as means of communication. Design elements, such as colour, material, design style, and functionality affect the product's message and can make it look for example feminine, aggressive or environmentally friendly. This research studied ways for mobile devices to communicate environmental friendliness. The focus was on perceived environmental friendliness, not the real environmental performance of the products. Through interviews and a survey, the study revealed a set of design elements that support an environmentally friendly image. Also, set of design elements that go against an environmentally friendly message were found. The semantic language of environmental friendliness is still immature. Therefore, in order to create an environmentally friendly appearance, the product's communicative elements must be clear and distinct and create a connection between the product and nature.

*Keywords: semantics, environmental communication, emotional design, product design*

## 1 INTRODUCTION

The great majority of consumers are interested in buying environmentally friendly products (Torvi & Kiljunen, 2005, pp. 81-82.). However, they still need to be motivated to carry out their interest as well as be sufficiently informed about the green products on the market. Companies' approach to environmentally friendly products is often mostly technical (weight, energy consumption, materials used, etc.) (Stilma, Stevels, Christiaans & Kandachar, 2004). Additionally, the promotion of environmental friendliness to consumers has mainly been done by adding technical information to the product (labelling and logos, certificates, information on the Internet). Companies communicate their environmental message through different media, but they seem to be overlooking one central means of communication: the product itself.

Design can be regarded as communication – as a language of its own. Products function as means of communication and self-expression (Karjalainen, 2007, pp.67-68). Through its design and function, the product expresses values that people then interpret; the semantic content and expression of the product creates positive or negative perceptions, emotions, values and associations within a person (Desmet & Hekkert, 2007, pp.61-62). People evaluate products and also judge or feel empathetic towards them through their personal interpretation. One can say that a product looks aggressive, feminine, sad or, for example, environmentally friendly. Though the general public's values are greening, their actions are not yet following the same path; consumers are not willing to make personal sacrifices for the environment (De Pelsmacker, Driesen & Rayp, 2005, pp. 363-385.). Greenness is rarely seen as the most desirable product attribute and, therefore, it rarely compensates the underperformance in other areas (Meyer, 2001, pp. 317–330.). The physical aspects of the product should be used to attractively convey the message of an environmentally friendly product, with the means of product semantics and emotional design.

This paper shows that product design and appearance can be used to communicate environmental friendliness. The study presented in this paper focuses on perceived environmental friendliness of selected products, thus it does not assess the real environmental performance of products or separate product attributes at any point. At the end of this paper we present a set of design elements, such as, colours, materials, forms and technologies which express environmental friendliness and others, which communicate an opposite message.

## 2 METHODS

The research was conducted as two separate phases. First, the qualitative-phase revealed an initial pattern of a semantic language, reasonings behind the answers, and assisted in finding the right questions and items for the survey. Second, the survey collected answers from a larger audience. Based on the results from the survey, we generated guidelines for product design to help in communicating environmental friendliness through product appearance. The elements of product appearance studied were colours, materials, design styles, general attributes, and technologies. The products used in this study were mobile devices. The target group for the study consisted of consumers who are positively disposed towards environmental protection, but passive in their actions.

### 2.1 Qualitative Research

The first part of the study was conducted with semi structured interviews. Also think aloud protocol was used to make explicit what is implicitly present in participants performing a specific task (Ericsson and Simon, 1993, pp. 78–80). The interviews were audio- and video taped, photographed and documented in writing. For the interviews, purposive sampling was used (Silverman, 2000, pp. 104–105). The participants were chosen according their ability to discuss design features and manufacturing process of products with the exception of one control participant who had no such specific expertise. All eight participants were Finnish, between the ages of 21-29. There were five males and three females.

The interviews were conducted in Finnish, and each interview took from 60 minutes up to 90 minutes. At the beginning the participant was specifically guided to think aloud and trust his first impressions. The interview session consisted of four parts: 1) background questions, 2) grouping-exercises, 3) technology questionnaire, and 4) concluding questions. First, to define the environmental segment the participants represent, they were asked general questions regarding their personal environmental attitudes, behaviour and values. Second, the participants were asked to organize and categorize different sets of items. This method is here called *grouping*, and has also been used by Stilma et al. (2004) in a similar study. The participants grouped colours (17 colours printed on paper), materials (21 pieces of material) and design styles (45 pictures of mobile devices in actual size) according to the perceived environmental friendliness of the items, regarding their appearance only. The grouping was carried out by arranging the items in question on an axis that portrayed dimensions of environmental friendliness, ranging from environmentally friendly to non-environmentally friendly. The items could be arranged on a horizontal line or into groups along the axis. The participant's verbal comments while arranging the items were equally important with the placing of the item on the axis. Third, the participants filled in a questionnaire evaluating the perceived environmental friendliness of technologies. As a starting point for the task, the participants were instructed to consider a "basic mobile device" that allows one to make and receive calls and send and receive text messages. The participants were then asked whether the adding of a certain technology either decreases, increases or has no effect on the perceived environmental friendliness of the product. In the fourth and the last phase of the interviews, participants were asked general questions on the relation of technologies and perceived environmental friendliness.

### 2.2 Quantitative Research

The second part of the research was conducted by an Internet-based, electronic survey. The questionnaire was available to a selected group of people. Internet-based survey has two main limitations to this case. First, it requires the participant to have access to the Internet. Second, it disallows presenting the participants with real materials and objects to touch and to hold in their hand. These losses were attempted to minimize by presenting the products in question from different angles and the materials as computer aided renderings, mapping real materials to a three dimensional image of a sphere, thus bringing the materials "to life" by shades and glare. Participants were selected through snowball sampling; participants for the first stage were chosen calculatedly, to reach a demographically versatile group of Finnish people, and thereafter these individuals were asked to name other individuals that shared the certain attributes that they do.

Like the interviews, the survey was based on evaluating colours, materials, design styles, general attributes and technologies. Now, the participants were not asked to place the items in an order of environmental friendliness, but the environmental friendliness was evaluated individually for each item (on a scale from 1 to 4, ranging from very environmentally friendly to very non-environmentally friendly). The survey participants were presented with verbal, non-numerical evaluation alternatives. The survey included 12 colours, 15 materials, 21 mobile devices and 16 general attributes (see Figures 1, 2, 3, and 4). The survey participants were divided into five segments based on their level of concern for the environment, their attitude towards environment protection and their likelihood to participate in environmental activities. The three most passive groups represented the target group of the study and only their answers were separated for analysis. The number of the environmentally passive participants was 107 out of 149 (the total number of participants).

After the survey, the colours, materials and design styles were ranked after by giving them eco-points according to the answers of the target group. If a characteristic element was considered as “very environmentally friendly”, it gained 4 eco-points. If it was considered as “environmentally friendly”, it gained 3, “non-environmentally friendly” gained 2 and “very non-environmentally friendly” 1 eco-point.

### 3 RESULTS

The qualitative data was analyzed to find patterns indicating appearance characteristics that consumers perceive as environmentally friendly (*eco*). The data assisted in selecting the colours, materials, mobile devices, general attributes, and technologies for the survey. The ones chosen were items and characteristics that had strongly divided the views of the participants, that are easy to implement to existing products (e.g. not polystyrene foam), and that are commonly used in existing products. Nonetheless, also some unconventional items and characteristics were kept, such as rock and leather in the material selection. The interviews revealed that different design elements have a different impact on the perceived environmental friendliness; usually material was seen as a stronger communicator compared to colour. Also, the haptic feel of a material and the mobile device as a whole are important when assessing the perceived environmental friendliness. The lack of design language for environmental friendliness was noticed during the interviews: the participants did not have mental models to evaluate the environmental friendliness of mobile devices, which made their evaluation process difficult. In the absence of a sophisticated *eco* design language, direct semantic links to nature, such as, nature metaphors were essential in evaluating the *eco*-message. The more the design language moved away from nature and towards a more mechanical feel, the more difficult it was to communicate environmental friendliness through the product appearance. Environmental friendliness in general is perceived as a soft value, whereas everything related to hard values, such as e.g. business or high-tech, is perceived to have very little to do with environmental friendliness.

We now present the results of the survey. Comparison of the results from the interviews and the survey shows that the answers correlate on most parts; e.g. the rank order correlation was high for colours and materials, but weak for the device evaluations. Figure 1 presents the survey results concerning colours. Based on the research, green, blue and white are colours that have the strongest reference to environmental friendliness, while black and pink are colours that have the least reference to environmental friendliness. Also, shades of blue are generally regarded environmentally friendly, whereas, shades of red are generally regarded non-environmentally friendly (*non-eco*). Cold, pure and clean colours were more often considered *eco*, whereas warm colours tended to be considered *non-eco*. The combination of black with red or yellow was considered aggressive and alarming and therefore does not support an *eco*-message. Pastel reds were considered colours of vanity, hence represented a *non-eco* image.



Figure 1 Results from the colours evaluation

The results from materials evaluation is presented in Figure 2. Natural materials, such as rock and wood, are perceived most *eco*, whereas, plastics and metals are the opposite. Generally, the less refined the material, the stronger its *eco*-message. Wood, stone, leather and textile were perceived more *eco* than metals, plastics and processed wood products, such as chipboard.

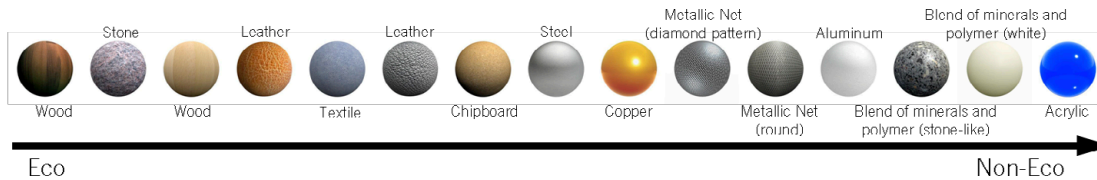


Figure 2 Results from the materials evaluation

Figure 3 presents the results from the design style evaluation. Simple and purposeful design style is perceived more *eco* than showy or technical looks. Monoblock mobile devices are perceived more *eco* than mobile devices with transformable form factor; monoblocks have a simple, purposeful appearance, which is regarded *eco*. An efficient but uncomplicated appearance supports an *eco*-message. The more stylish the mobile device appears, the less it seems to communicate an *eco*-message.



Figure 3 Results from the mobile device evaluation

Technically simpler and durable mobile devices were perceived more *eco* than music-, video- or 3G mobile devices. The more complex, technical and showy the product appearance, the less it communicates environmental friendliness. The most common comments for *eco*-appearance are modesty, plainness and simplicity in design and technologies, quality appearance, durable appearance, and compactness (in size). The most common comments for *non-eco* -appearance are dashy, boasting or aggressive appearance, poor quality appearance (e.g. plastic appearance was regarded low quality), “alarming” colours, and useless elements (too much decoration). (Figure 4)

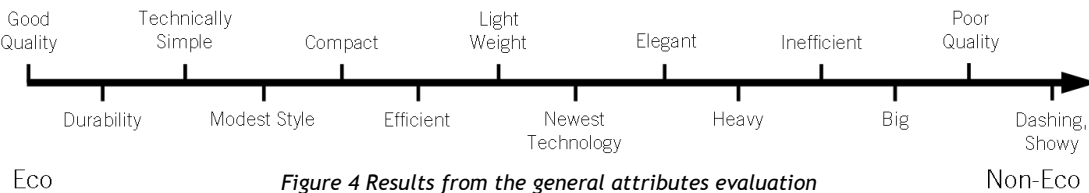


Figure 4 Results from the general attributes evaluation

#### 4 CONCLUSIONS

Environmental awareness is on the rise, and the demand for environmentally friendly products is increasing. At the same time, consumers are also becoming more demanding towards environmentally friendly products, and they will not sacrifice their personal well-being, style or time for the better of the environment. Products are more and more similar in technological terms and design style has become one of the most important means to differentiate products. Although product design is a central means of communication, it is still often overlooked by most companies when it comes to environmental

communication. Good design can be used to both enhance the attractiveness of the environmentally friendly products as well as to communicate its *eco*-message.

All products consist of elements such as colour, material, design style, functionality, as well as attributes, such as size and weight. Design teams can use these elements to compose and communicate a specific message through product and though affect the way people perceive products. The aim of this research was to identify the specific design elements that communicate environmental friendliness. The study focused on the *perceived* environmental friendliness, not the true environmental performance of the products. Therefore, the results of this study are not necessarily in line with the real environmental friendliness of colours, materials, design and technologies. Our study presented elements for environmentally friendly product appearance in terms of colours, materials, design styles, and general attributes. The elements that were considered *eco* by the research participants can be used as alphabet in creating and sending an environmentally friendly message through the product. When applying these design elements it is worth noticing that in regard to environmental friendliness, design style is a stronger communicative element than material or color. In addition, material is a stronger communicative element than color.

According to our study, the colours for positive environmental appearance are green, blue, and white. As regards green, which was the premium *eco*-color, the pro-environmental message is most likely learned. Green has been the traditional color used when communicating environmental friendliness. However, consumers seem to be becoming skeptical towards green, and therefore the use of this color should be careful. The colours for *non-eco* appearance are black, different shades of red, yellow, and silver. In terms of materials the positive environmental appearance is created through natural materials like wood and rock. The most common materials for *non-eco*-appearance are metals, polymer composites, and plastics. Most common design style characteristics for positive *eco*-appearance of mobile devices are simplicity, small and compact size, and durable and reliable appearance. Modest style, high price, good quality and lightness are also attributes that are currently linked with environmental friendliness. Durable and basic mobile devices, which are meant to be more robust or just simple tools for dialling, are perceived to be the most *eco*. Common comments for a *non-eco*-appearance of mobile devices are stylish, technical and complicated, and delicate mechanisms, e.g. swivel mobile devices. Stylish and more decorative mobile devices were considered vain, and therefore they did not support the *eco*-message. Mobile devices with transformable form factor were considered less *eco* than the so called monoblocks; the more technical and complex a mobile device appears, the less it supports an *eco*-message. Silver, grey and black colours seem to increase the technical appearance and promote hard values, which do not support an *eco*-image.

Culture, gender, age and the level of education among other things all affect the way human beings perceive colours, materials and design style; in a given culture certain colour can symbolize a totally different thing than in other. In this research the participants were all Finnish citizen and the results represent the values of this specific social group. To reveal international variations the study should be conducted within other national cultures.

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