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Towards An Internet Based Visual Tool for Communication with Consumers in Early Phases of the Product Development Process

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Introduction

Consumers of today demand more from products than functionality also emotional needs are also to be fulfilled (Jordan, 2000). While the importance of consumer input to product development is of increasing significance, participation of end-users is still limited due, in part, to confidential issues. Consumer involvement that effectively influences product design is rare in Swedish industrial design consultancies, as user studies are often experienced as being rigid and as obstacles for creativity (Christoforidou, 2004). Extensive processes for evaluating user preferences are often left uncompleted (Karlsson, 2006). Similar findings have been reported in England (Hasdogan, 1996).

Industrial companies often have insufficient information to take decisions regarding user requirements. In a smaller study of Swedish SME's that were developing furniture and lighting products, it was found that requirements were often determined by the companies themselves (Wängelin, 2004). Hence, in manufacturing companies as well as design consultancies, there seems to be a need for easy-to-use, stimulating tools for communication with consumers in order to design appropriate and appealing products.

The objective of an ongoing research project is to develop a tool for elicitation of consumer experiences of visual product properties. The tool should be self-instructional and suitable for use in a web based application to facilitate access to larger numbers of respondents through remote communication. In recent years, untraditional and exciting visual and game-like product emotion tools have entered the scene (Desmet, 2002). Surprisingly, few of these use internet to collect data. The aim of this paper is to describe the development of a tool intended for internet use, and to provide a vision of its experimental application in product development and design.

The origins of VIPET

The User Compass Chart (UCC) is a recently developed tool (Sperling, Eriksson, 2006) designed to measure user perceptions, feelings and mental projections of visual product qualities. The origin of the UCC is the compass or sector chart used by Russell (1980) for measuring affect. Sector charts have been used in industrial strategic development to position future products in relation to existing competitors and to direct design towards a target. They are also frequently used by practising industrial designers.

The UCC tool consists of a game board with two intersecting vertical and horizontal axes, at each endpoint labelled with opposite adjectives. Each adjective is presented together with verbal associations. The crossing axis represent two intersecting rating scales with the central part of the UCC featuring a neutral (neither/nor) zone. Adjectives with positive connotations are located in the north-east (or upper right) sector.

Sperling and Eriksson (2006) used the UCC tool to categorize user experiences of material samples in a study of automotive interior materials, while Sperling (2006) used pictorial product representations to study perceptions of future easy-chairs. Full -scale real products can be categorised by means of the UCC tool. Using the tool, respondents are asked to position each provided sample in the sector which they regard as most adequate. They are also asked to think aloud about their experiences of the included samples. At the end of the experiment, in contrast to most other tools for perceptual measurement, respondents are able to readjust the positions of the samples in relation to each other. The whole experiment is video documented and the completed chart is documented with a digital camera. The UCC procedure provides qualitative as well as quantitative and visual data.

From analogue board to internet tool

The automotive and furniture studies provided promising results for the UCC tool. However, it became apparent that a complementary tool was needed if one wanted to include a greater number of respondents with a less effort. For example, during the UCC experiments, the time taken for the respondents to get used to the two-dimensional scaling became a concern. Furthermore, transcriptions of video and sound recordings required for the study were very time consuming. In an effort to facilitate data collection, the use of the internet in connection with a database was found to be a suitable solution.

It quickly became evident that an internet based tool would require quite a different interface compared to its physical predecessor. It would not have the same capability to guide and support the respondents as in the direct and personal experiments. It would have to rely on elementary one way communication in order to reduce ambiguity during the test situation. This was resolved by splitting up the task of positioning images in several defined steps, each having a restricted degree of freedom, designed to guide the respondent in the task of negotiating a limited amount of information at each step. This is one of the reasons why the internet tool allows the respondent to concentrate on one axis at a time (*Fig 1)*.

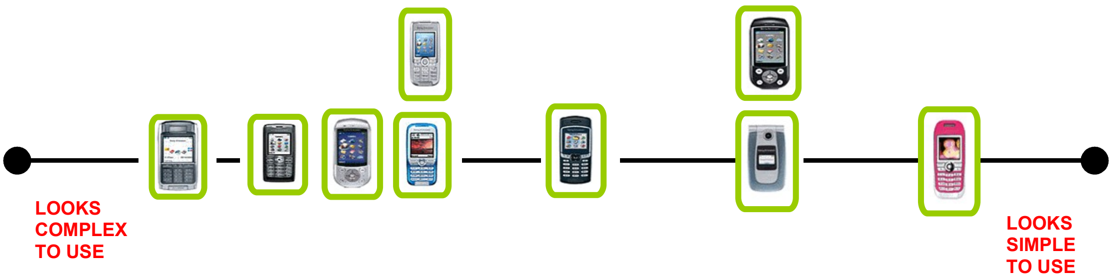

Figure 1. Illustration of a product positioning by a male respondent in a pre-study of mobile phones. Representations were positioned along a horizontal visual analogue scale with two opposite word descriptors. Identically assessed phones were placed vertically in relation to each other by the software application. *(With permission from Louise Ernmark and Britt-Inger Lustig Bremer, Sony Ericsson, Lund, Sweden.)*

VIPET is primarily designed to deliver a plotted visual result that is easy to analyse, based on consumers' experiences of photo represented products, for example. The result is immediately imported into Microsoft Access (SQL) for visual and statistical analysis. Using this process, the VIPET database can execute and account for almost any required presentation of results.

Assessment scales and semantics

When elaborating VIPET, problems related to assessment rating scales and semantics were considered. Early on, the use of visual analogue scales, which have found extensive use in medical applications for subjective pain assessment (see, e.g., Gould et al., 2002) but also for assessment of product qualities in interview studies (see, e.g., Wikström, 2002), were selected as a rating scale. Various approaches for marking the end points of visual analogue scales have been used. In clinical studies, a continuous scale ranging from "no pain" (0 mm) to "worst pain imaginable" (100 mm) or similar is often used. Wikström used scales marked "Maximum" at one end, "The opposite" at the other and "0" in the centre.

The use of rating scales such as a semantic differential scale for product evaluation is semantically a delicate matter, which must consider respondents' various word denotations and connotations. A means to attend to this problem is to provide the respondent with suggestions on how to interpret the quality that is to be assessed. This can be done by providing examples guiding the definition of the assessed parameter. For example, the interpretation of "intuitive" can be narrowed down by explanatory words like "self-instructing, easy to use". This has been tested with good results in a study of visual identity in automotive design, using visual analogue scales (Warell et al., 2006).

The VIPET tool, as opposed to the UCC tool, requires respondents to assess only one dimension at a time (see example in *Fig. 1*). Judging only one quality on each scale is, from a semantic point of view, less cognitively demanding than using two scales at the same time. It is less complex and more reliable to interpret, for example, the perceived presence of the single quality *Sportiness* on a continuous scale, than a scale with two opposing parameters such as *Sporty* on one end and *Sophisticated* on the other. Dichotomies at first regarded as unproblematic, such as *feminine – masculine* are, when scrutinised, in fact often, rather insidious. If we define masculinity for the respondent as strong, sturdy, and aggressive it becomes obvious that these can also be feminine qualities. However, dichotomies with two or more cross tabulated parameters were used in some recent studies, but they have all been carried out through interviews and under conditions similar to a usability laboratory environment (see, e.g., Fenech, 2006; Fisher, 2006; and Skogen, 2006).

Scenario of how VIPET could work in practice

A scenario using the tool could proceed according to the following steps:
The depicted products are first presented in random order one the screen, one at a time. The respondent then positions the picture using the cursor along a horizontal line, "click and drop". A larger picture of the product can now add other multimedia representations of sound, for example. When all products are positioned along the horizontal axis, the results disappear from the screen and an axis with two new adjectives to rate appears. The respondent places the same products again. Finally, the two crossing axes appear as one horizontal and one vertical axis presenting a synthesised image of the previously assessed products. The respondent is now prompted to reposition the samples, if necessary. When this is done and the placement is saved, it is presented to the respondent as a bipolar chart with both parameters visible at the same time *(Fig. 2)*. The result is subsequently imported to Microsoft Access (SQL) for visual and statistical analysis. In this way the VIPET database can execute and account for any required combination of parameters.

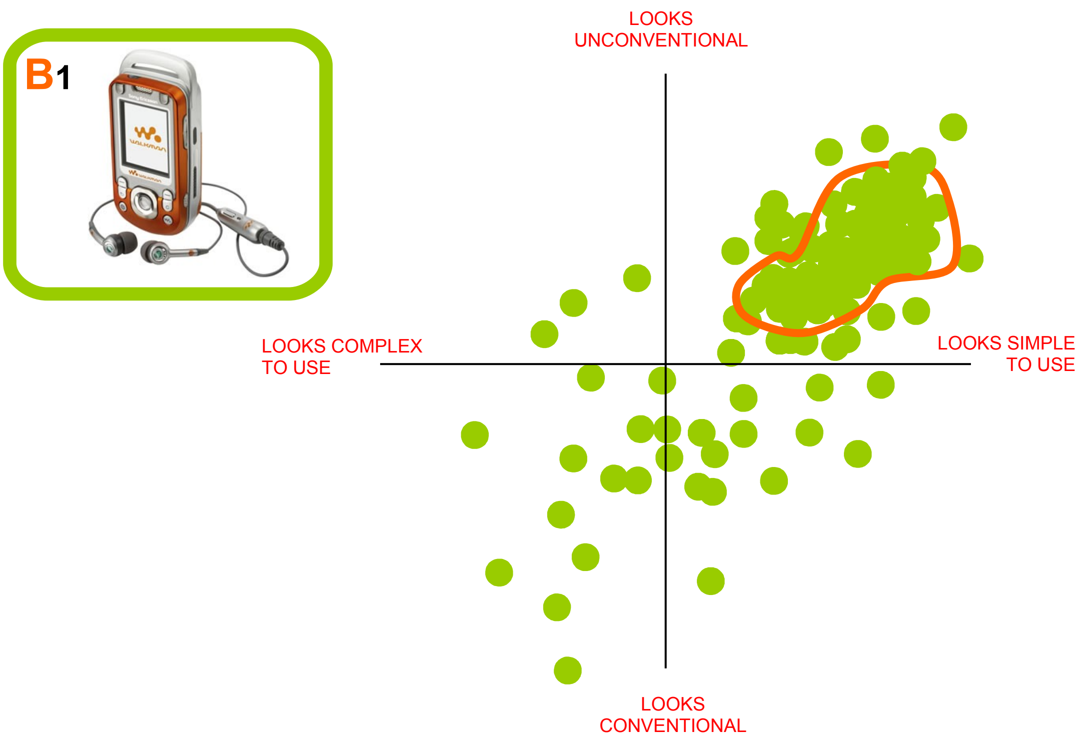

Figure 2. Graphic model of plotted simulated test results after being imported to Microsoft Access (SQL). The graph shows a selected segment of females (25-35 years of age).

If the respondent is unknown and not a member of a committed user panel he/she may be requested to submit background data. If the respondent has found the test on a homepage and there is no commitment, a *"tell us your taste and we tell you your character"* test can compensate the respondent with an exciting nonscientific personal analysis. Newspapers and magazines have since long had similar self tests and their readers are familiar to them.

Discussion

The VIPET tool offers a visual holistic approach but does not provide a design team with a more ordered step-by-step structural process such as in Kansei Engineering. However, in the product development process, it would be possible to navigate towards a target by repeated experiments in different phases of design, using sketches or pictures of mock-up models as visualisations. Separate design elements such as colour, transparency or product details can also be studied. This could be an advantage in advanced stages of product design in order to eliminate risks of revealing confidential design work.

In the pre-studies presented above, the respondents were not able to report comments; however it will be further examined to see if this is desirable. In a global or at least remote study, it may be difficult to control the circumstances under which comments are delivered. Although it is often an advantage to be able to execute a study via internet, researchers do not have the same control over and knowledge of the situation as when the respondent is physically present in a usability laboratory. An internet tool can only provide the respondent with a limited amount of feedback.

As with all graphic displays involving parameters, the research leader must be highly aware of the implications that may arise when cross-tabulating axes for visual presentation of results, in order to retain the reliability and validity of the tool while analysing the results. VIPET must be used with a clear sense of what it is and is not useful for.

We read text and pictures differently if they are appearing on a physical card, in a book, on a poster or on a screen. We even have different experiences of one and the same picture or text on a screen depending on the character, size and resolution (Frohlich, 2004). Using internet for measuring consumer perceived product qualities through picture representations is therefore a delicate task. The risk of misinterpretations is evident but a cognitive and smart interface might keep them to a minimum.

As the work with the VIPET software has progressed, the program has been in contact with a number of different actors in the field of industrial design and product development. The early test versions have already met with a positive response. So far it appears as though this simple and easy-to-use internet based tool could be advantageous especially for companies with limited resources.

Further studies have been initiated, involving a larger pilot test study. It is expected that this pilot study will provide the researcher with promising and important information and experiences for future improvements of the VIPET tool.

It would be most interesting and fascinating if future design researchers could develop new, down-to-earth tools that that could grasp the path from measuring product emotions to actually providing factual guidelines to designers and product developers in small and medium sized enterprises in their everyday work.

Conclusions

The unique nature of the VIPET as an internet based tool is a combination of a number of advantages. The compass model is recognised as an established model in industrial strategic development. Its visual nature supports a holistic view.

The interface provides a simple display that seems to be easy to understand and use, not only for the researcher or designer, but also for the respondents. Furthermore, the visual nature of VIPET seems to make the research situation vivid and inspiring for the respondents. The respondents can relate to and compare all products included in a test simultaneously, the visual display presents the results directly, thus making it easy for respondents to assess whether they have indicated their preferences as intended.

The transformation from collected to analysed data is short, fast and can also be continuous. The new form of visual and direct visually plotted presentations of the results is easy to follow and can provide statistical trend indications during the progression of a test.

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