Empathic design: emerging design research methodologies

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Empathic Design:
Emerging Design Research Methodologies

by

Deana Catherine McDonagh

A Doctoral Thesis
submitted in partial fulfilment of
the Loughborough University
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Empathic Design: Emerging Design Research Methodologies

Abstract

A new relationship between product designers and the users of products is emerging. It is now being realised that users have complex supra-functional needs, which include the emotional, spiritual, social, tribal aspects of the relationship between particular products and the user/consumer. Users seek more than mere functionality. In order to meet these needs designers need to actively develop research methodologies that are specifically aimed at collecting design relevant data which includes the often difficult to grasp elements of the supra-functional.

The comfort zone for many designers involves designing products for themselves (or people like themselves) when intuition and insight can be closely matched. In modern, international markets and with increasingly demanding consumers, such approaches are inadequate. However, it is possible for designers to become directly immersed in researching users' needs and experiences rather than rely on third party research which, whilst potentially valuable, does not enable the same intimacy and potential for growth of experience for the designer. This approach is termed empathic design research. It seeks to broaden designers 'comfort zone' by expanding the number of people they can empathise with, broadening their 'empathic horizon'.

This thesis presents a body of published work by the author that explores the position of design research in relation to the changing role of Industrial/Product designers. The thesis consists of an introductory paper that pulls together the various strands in the published work. Following this a set of ten journal papers, one refereed conference paper and three book chapters is presented. The work as a whole defines a number of research approaches that designers can employ to elicit and understand users' supra-functional needs. The papers establish the evolving context of product design and the growing interest in User-centred Design in its various forms. They examine research approaches that extend beyond user observation, involvement and draw the designer into a more empathic contact with users to illuminate functional and supra-functional requirements. Designers must learn to 'get under the skin' of the user; to develop empathy with users from population groups very different from their own in terms of culture, age and ability. This empathic intimacy can result in data generation and insight with this evaluation becoming an integral part of the designing process. The changing role of the product designer, as well as the nature of the design research process, frames the argument for adopting an empathic design research model. Finally, the author explores the implications of this important paradigm shift for design education.

1 Within the context of this thesis, 'user' is a general term that refers to both consumers and customers. Deana McDonagh © 2006
Acknowledgements

Dr Howard Denton who is my inspiration. Professor David Weightman for keeping me on the straight and narrow. Dr Laurel Campbell for her support and guidance. Maisy and Thomas my feline friends, who never failed to highlight that the manuscript was only ever a pile of paper for them to sit on.

To parents, family and friends who have suffered during the years it has taken for me to compile this research. Who learnt not to ask how the process was going! This presents a body of work has been possible thanks to my generous collaborators (Dr Anne Bruseberg, George Torrens, Cherie Lebbon, Joseph Langford, Cheryl Haslam and many more).

Collaboration is a way of life and my journey is just beginning.
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**Research to support designing**


Deana McDonagh © 2006


Implications for design education


Denton H and McDonagh D (2003) Using focus group methods to improve students' design project research in schools: drawing parallels from action research at undergraduate level. International Journal of Technology and Design Education. 13 (2) pp 129-144.


McDonagh D and Denton H (2005) Exploring the degree to which individual students share a common perception of specific mood boards: observations relating to teaching, learning and team-based design. Design Studies. 26 (1) pp 35-53.

McDonagh D (in press) Empathic research approaches to support the designer: A supra- qualitative research for designing model Design Issues.

Letters from contributors
Introduction

This work is a body of published papers in which the author has explored the development of approaches to research by designers that aim to enhance the designer's ability to empathise with a broader product user range. In addition these approaches have sought to improve the designer's ability to identify design relevant elements of supra-functionality: that is the emotional, spiritual, social, tribal aspects of the relationship between particular products and the user/consumer. The papers also seek to explore how such design research approaches may be taught at undergraduate level.

The work consists of this introduction, followed by a section that sets out context for the work, defines the terms used and establishes the relationships between the papers and the emerging themes. The papers are then summarised in tabular form. The collection includes ten journal papers, one refereed conference paper and three book chapters. The table presents the papers in four sub-sections: supra-functionality, research to support the design process, implications for design education and, finally, empathy. Each entry is identified with the journal, conference or book together with collaborating authors. The significance of each paper is identified and then the contribution to knowledge identified.

As research for design draws upon approaches and techniques from fields such as social sciences, ergonomics, market research and psychology, the opportunity to collaborate with experts in such areas can significantly enhance the final design outcomes. Collaboration is becoming an essential component of successful design, as it enables designers to create synergistic connections with experts in other disciplines and fields. In professional design practice, designers rarely, if ever, operate alone rather they are engaged with the client and members of the wider design and production team.

\[2^2\text{Within the context of this paper, 'user' is a general term that refers to both consumers and customers.}\]
List of publications

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<tr>
<td>McDonagh-Philp D and Lebbon C (2000) The emotional domain in product design. The Design Journal 3 (1) pp. 31-43.</td>
<td>This paper presents one of the first of the design process models that refers to emotional needs of users. It also links supra-functionality, research for design and industrial design training.</td>
<td>The paper represents one of the first published papers by the author that explored the emotional domain in relation to users' needs and experiences and how it may be integrated within undergraduate industrial design training.</td>
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<td>Bruseberg A and McDonagh-Philp D (2001) New product development by eliciting user experience and aspirations. International Journal of Human Computer Studies. Volume 55 (4) pp. 435-452, October.</td>
<td>Fourteen focus groups were conducted that explored user attitudes to small domestic appliances. A number of design methods were introduced and developed during this study (product personality profiling, mood boards, focus group discussion, users drawing their ultimate product) for use by industrial designers.</td>
<td>This paper concentrates on designers becoming more involved within the data gathering processes to generate evidence to support their design decision-making. The process also provides valuable insight and stimulation for design concept generation.</td>
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<tr>
<td>McDonagh D, Bruseberg A and Haslam C (2002) Visual evaluation: exploring users' emotional relationships with products. Applied ergonomics: Human Factors in Technology and Society, May 33 (3) pp. 237-246.</td>
<td>The user navigates around and through the product using a series of visual, tactical and auditory cues. The language of these visual clues is known as product semantics, and relies on the user's perceptions, previous experience and ability to interpret the product language.</td>
<td>The process of selecting images can be valuable; enabling the user to externalise and communicate the meaning they attach to each image. This can help the designer to 'tap' into the wealth of the user experience by adding another means of communication that can convey feelings, which are often difficult for people to articulate.</td>
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<td>Weightman D and McDonagh D (2003) People are Doing it for Themselves, in the Proceedings of the International Conference on Designing Pleasurable Products and Interfaces, Forlizzi, J, Hanington, B and Ayoob, E (eds.), ACM Press, Pittsburgh, Pennsylvania, USA, 2003, pp. 34-39.</td>
<td>Customisation is where users take a mass or batch produced artefact and adapt it in some way. This is distinctly different from user-centred design, where designers are trying to identify and satisfy the users individual needs and respond to them within a product. This paper reviews existing developments and forecasts the emerging role of the user within the designing process.</td>
<td>The emphasis to date has been on the designer eliciting user needs and responding to them. This also enables a new approach to the satisfaction of users supra-functional needs through choice and direct action. This paper explores approaches to enable the user to modify, specify, adapt and create products to match their personal needs directly.</td>
</tr>
<tr>
<td>McDonagh-Philp D and Denton H (1999) Using focus groups to support the designer in the evaluation of existing products: A case study. The Design Journal 2 (2) pp. 20-31.</td>
<td>This paper explores the potential contribution of focus group methods within the designing process, with particular emphasis on the designer as group participant and moderator.</td>
<td>This paper highlighted the need for designers to develop these methods of user research, expand their own empathic horizon, and go beyond their individual comfort zone of personal knowledge and experience.</td>
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<tr>
<td>Bruseberg A and McDonagh-Philp D (2002) Focus groups to support the industrial/product designer: A review based on current literature and designers' feedback. Applied Ergonomics: Human Factors In Technology and Society, 33 (1) pp. 27-38.</td>
<td>The emotional domain of product design is now recognised as a significant area that impacts upon product development. Focus group activities provide a method to elicit user views, opinions, experiences and aspirations, which may not be accessible through more quantitative methods.</td>
<td>This was a first study of its kind by the author that concentrated on using focus groups to develop designers' perceptions of users within new product development. It became evident that designers frequently perceive users as having limited imagination. They also perceive that design research takes them away from actual 'designing'.</td>
</tr>
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<td>Bruseberg A and McDonagh D (2003) Organising and conducting a focus group: The logistics. pp. 21-50. In Langford J and McDonagh D (eds.)(2003) Focus groups: Supporting effective product development. London: Taylor and Francis.</td>
<td>This paper presents the views and perspectives of five design practitioners and seven design students regarding focus groups as a technique to support their designing processes. By integrating design research methods within their designing process, designers can utilise users as an indispensable design resource.</td>
<td>This designer-centred research development process helped to reveal a number of psychological barriers that would hinder the practitioners from adopting and employing focus group as a technique. This insight supported further development of techniques that focused on relevance and the more visual and emotional elements of research for design.</td>
</tr>
<tr>
<td>Publication</td>
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<td>Bruseberg A and McDonagh D (2003) Organising and conducting a focus group: The logistics. pp. 21-50. In Langford J and McDonagh D (eds.) (2003) Focus groups: Supporting effective product development. London: Taylor and Francis.</td>
<td>This chapter offers practical advice for designers who intend to conduct a focus group with associated activities. The majority of procedural literature that was available at that time was tailored specifically for market researchers and social scientists.</td>
<td>This chapter represents one of the first published materials that targeted designers. Conventional design tools explored in depth include product personality profiling, product evaluation, visual questionnaires and the use of abstract images to communicate needs and aspirations.</td>
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<td>Langford J and McDonagh D (2003) Focus group tools. pp. 173-224. In Langford J and McDonagh D (eds.) (2003) Focus groups: Supporting effective product development. London: Taylor and Francis.</td>
<td>This chapter summarises tools and activities that can be employed to extend the effectiveness of focus groups. It explores tools/activities within four main stages of participant interaction, including immersion and warm up, problem analysis, idea generation and development and finally concept evaluation.</td>
<td>A diverse range of tools is discussed, including their limitations and potential benefits to the designer. The main contribution of this paper is that it combines the experience of design practitioners, researchers and academics. It brings together a comprehensive range of design-relevant activities and techniques that can be employed during focus group activities.</td>
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<tr>
<td>Garner S and McDonagh-Philp D (2001) Problem interpretation and resolution via visual stimuli: the use of 'mood boards' in design education. The Journal of Art and Design Education, 20 (1) pp. 57-64.</td>
<td>They have long been taught to art and design students, but rarely has their use been analysed. This paper explored the potential benefits of mood boards, which have been a relatively misunderstood and under-used tool.</td>
<td>It represents one of the first published papers on the value of mood boards. This paper provides the reader examples of mood boards, discusses a final year undergraduate project in relation to the contribution of the mood board, and highlights the potential value that the use of mood boards offer the designer through their designing process.</td>
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<tr>
<td>Denton H and McDonagh D (2003) Using focus group methods to improve students' design project research in schools: drawing parallels from action research at undergraduate level. International Journal of Technology and Design Education. 13 (2) pp.129-144.</td>
<td>This paper provides a background of this research method and explores other techniques including product handling and visual evaluation. A protocol that had been developed over a five-year period is discussed. Effective adoption approaches are discussed.</td>
<td>The use of focus groups as a research method has been adopted from outside the discipline of industrial design. The authors have adapted it and developed it specifically for use by industrial designers. Encouraging this type design research was found to be valuable in building empathy and shared understanding between the student designer and user.</td>
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<td>McDonagh D and Storer 1 (2005) Mood boards as a design catalyst and resource: researching an under-researched area. The Design Journal 7 (3) pp.16-31.</td>
<td>This paper presents an analysis of the use of mood boards within the designing process of industrial design students. It also explores the common misconceptions and misuse of mood boards.</td>
<td>This paper presents the findings of a scoping study that revealed design practitioners valued mood boards as a tool for communicating with non-designers and as an instrument to inspire lateral thinking.</td>
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<tr>
<td>McDonagh D and Denton H (2005) Exploring the degree to which individual students share a common perception of specific mood boards: observations relating to teaching, learning and team-based design. Design Studies. 26 (1) pp. 35-53</td>
<td>As contemporary product design is more team based; how can we be sure that the individual designers and stakeholders in any team perceive a given board in a similar manner? If there are significant differences in perception then the team may be pulling in different directions.</td>
<td>Consumer perceptions of a product's 'gender' has been identified as a significant factor in product design. The results, whilst based on a limited sample, enable discussion relating to teaching and learning issues for industrial design students and the ways in which they may be employed in team-based design.</td>
</tr>
<tr>
<td>McDonagh D Empathic research approaches to support the designer: A supra-qualitative research for designing model. Design Issues (in press)</td>
<td>Industrial design is now focused on user experience rather than the detail of product design. The model and associated research approaches presented within this paper provide a platform on which designers can further develop empathy and shared understanding with users.</td>
<td>This paper argues that a new model of research for designing is emerging. It is based on the interaction of a number of elements, (i) users' experiences, (ii) user-centred design, (iii) conventional (market) research, and (iv) encouraging designers to have direct contact with users (fieldwork) and (v) the emerging role of empathic research approaches (Naturalistic research methods).</td>
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Introductory Paper

Empathic Design: Emerging Design Research Methodologies

1 The Context of Product Design

There has been an increase in public awareness of design since the 1950s. One manifestation of this has been the wide use of the suffix "designer" attached to products to denote style, quality or added desirability, frequently without much justification (Sparke 1987). Gloria Vanderbilt's company was one of the first to do this, labelling their product "designer" jeans with a better fit and a premium retail price. The suffix has now become discredited by overuse, as well as inappropriate use, but the general public awareness of good design has survived and expanded.

Recently, Fast Company magazine featured an article on 'Masters of Design' (Breen et al 2004). These Masters included David Kelley (founder of IDEO), Jonathan Ive (Vice President of Industrial Design at Apple Computer Inc.), John Maeda (Professor of Media Arts and Sciences, MIT), and William McDonough (Architect). They declared that we are in the midst of a revolution in the business world; with the acknowledgment that design 'is no longer just styling: Design matters. The relevant message for design researchers included five lessons learned from the featured Masters: (i) design is the differentiator – a distinct appearance and feel will encourage customers to purchase products; (ii) those who write the rules, rule – designers need to become participative in creating design road maps; (iii) confront the unfamiliar; (iv) make it real – translate inspiration into real products that customers can relate to; and (v) get emotional – when you make an emotional connection with customers, you win their loyalty.

Smart Design, a New York based design consultancy, recently conducted a survey in the US that sought to assess changing consumer attitudes towards products as well as the current meaning of "design" itself. More than 700 consumers were surveyed about their new product purchases. The results indicated that consumers based their personal satisfaction with a product on the likelihood of them forming an emotional connection with the product. Products that "far exceeded expectations" – which surprised people with their ability to perform, and products that created a happy experience, were associated with both "satisfaction" and with the idea of "design" itself. The findings confirmed that these emotional attributes had a much stronger influence than aesthetics (McDonagh and Formosa 2004)¹.

Chapman professes that there is a need for 'a specialist design genre that caters for deeper; more profound and poetic human needs, taking users beyond the ephemeral world of techno centric design toward a rich, interactive domain of emotionally durable objects and experiences' (2005: 24) and adds,

... these physical objects serve a deeper and altogether more profound purpose that is frequently overlooked; consumable objects and experiences provide a means for us of engaging with the world on both rational and emotional levels. (Chapman 2005, p19)

Understanding these emotional aspects must be integrated into the designer’s decision-making processes and this includes addressing supra-functional needs as an important aspect of product design. A truly ‘successful’ product offers a balance of both functionality and supra-functionality (Weightman and McDonagh 2002), which is often not the case at present. Van Hinte (1997) suggests agreement with this point: "Owning tangible things is an undeniable human need. Products provide symbols of identity to their users and the people around them. They carry meaning and are constant reminders of who we are, where we are, our activities, our history and our future."

¹ A product's aesthetics may have an immediate effect on a purchase decision, whereas satisfaction is more long term – influencing sales by product association, user-product bonding and user loyalty.
The relationship between consumers, manufacturers and products has also dramatically changed. Developments in manufacturing methods, such as customisation and mass-customisation (Weightman and McDonagh 2003), are enabling many more individual choices about the detailed nature of the products that people purchase. As an example, in Puma stores in the USA, the Mongolian Barbeque shoe design system enables buyers to specify the colours and materials of the components used to make up a pair of training shoes. Once the specifications have been established, the component parts are sent off to a manufacturing facility, the shoes are constructed, and arrive for collection at the store within a matter of weeks. Similar arrangements based on websites or in-store terminals exist for Levi jeans, Toyota Scion cars, Timberland shoes, Dell computers and many more consumer products. Developments in rapid prototyping and other individualised computer based manufacturing and assembly processes create the possibility for individualised products created to the specification of the individual user. Such technological and manufacturing developments have significant implications for designers because the user becomes an active participant in the designing process, thus raising users’ expectations of products even further.

2 User-Centred Design / Participatory Design

Involving the user within the designing process has not always been accepted practice; rather, there has been an on-going debate since the 1960s on the value of user involvement and participation. Users can become significantly and actively involved on two levels. Firstly, they can provide a central focus for the designer (User-Centred Design, Human-Centred Design, Universal Design and Inclusive Design). Secondly, they can become active participants within the designing process (Participatory Design). Participation within the designing process can ensure more user-designer contact, resulting in more authentic insights. Reich et al (1996) found that:

Participatory design was considered the antithesis of traditional design in which designers are expected to exhibit their expertise... An assumption of traditional design is that active user involvement comes after the design process is over... In traditional design, participation is often side-stepped by reducing the user to a databank.

These authors also challenge human factors and ergonomic experts who profess to representing the user within the data that they have gathered. However, user involvement within the designing process is now recognised and valued as a dynamic on going activity (Reich et al 1996). The following (Table 1) highlights some of the terms used under the umbrella term of User-Centred Design to indicate user involvement within the designing process:

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<tr>
<th>Term</th>
<th>Definition</th>
<th>Source</th>
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<tr>
<td>User-Centred Design</td>
<td>User-Centred Design approaches extend the centrality of the user beyond the initial research phase throughout the designing process.</td>
<td>McDonagh-Philp and Lebbon 2000</td>
</tr>
<tr>
<td>Human-Centred Design</td>
<td>Design research that encompasses a set of methods and practices aimed at getting insight into what would serve or delight people... it amplifies the designer's ability to shape popular culture and to smoothly transit values through design.</td>
<td>Laurel 2003</td>
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<tr>
<td>Universal Design</td>
<td>The design of products and environments to be usable by all people, to the greatest extent possible, without adaptation or specialised design.</td>
<td>Christophersen 2002</td>
</tr>
<tr>
<td>Inclusive Design</td>
<td>A process whereby designers and manufacturers ensure that their products and services address the needs of the widest possible audience.</td>
<td>Clarkson 2003, DTI Foresight 2000</td>
</tr>
<tr>
<td>Participatory Design</td>
<td>Users' direct involvement in the design and decision-making process that helps to generate continued insight and knowledge.</td>
<td>Luck 2003</td>
</tr>
<tr>
<td>Barrier free Design</td>
<td>Making environments, systems and products more accessible and useable for a wider range of people with a range of disabilities.</td>
<td>Martin 1992</td>
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Table 1: Sample of definitions for approaches that involve the user within the designing process
All of these approaches have been developed and expanded by including the widest possible range of people, thus reducing the number of individuals who are excluded from the benefits of good design.

A good example of an inclusively designed product that combines excellent functionality with supra-functionality is the OXO Good Grips range of domestic kitchen tools. They provide sound ergonomics whilst de-stigmatising what are basically 'assistive aids', thus adopting a design approach which de-emphasises the impression that users have any physical disabilities. Many people are proud owners of these useful and easy-to-use devices, which support users of all ages and abilities. Even for a user with few or no impairments, using such kitchen tools is a pleasant experience, especially when there are occasions when fatigue or illness can make it difficult to perform simple tasks. The success of this product line demonstrates that Universal Design can benefit all users. Promoting this range of products to all users rather than only those with handgrip and dexterity difficulties reduces the psychological barriers to using 'assistive technology' products, for those who really need them.

For the aging individual or someone with physical or cognitive disabilities, navigating through the material landscape can become a daily battle. By practicing Inclusive Design, Universal Design, Human and User-Centred Design and Participatory Design, more designers and design researchers are developing ways in which products, systems and environments can accommodate and satisfy a wider community regardless of age, ability, physical size, culture or gender. But in doing this, designers can no longer rely upon their own personal experience and understanding. For example, it has been estimated that in the UK alone there will be an increase of older people (aged 65 years and older) from 9.3 million (in 2000) to 13.3 million by 2025 (Office for National Statistics, 2002). In addition, the rise of civil rights with legislative support, such as the American Disabilities Act in 1990, has had a positive impact on products, environments and systems launched into the market place. Progressive designers are responding to the expanding numbers of an aging population with shifts in demographics (more accessible information than ever via the Internet). In addition, increased access to information via the Internet, means that users' expectations are rising (Cagan and Vogel 2003, Laurel 2003). Designers are contributing to barrier free, inclusive designs that integrate users as participants within the new product development process (Clarkson et al 2003).

3 Developments in Design Research: The Designer as Researcher

Due to rising user expectations, the design process has shifted from being designer-centred to a focus on the user (Laurel 2003, Poulson et al 1996, Woodson 1981, Preiser and Ostroff 2001, Christophersen 2002). Designers often deal with 'wicked problems' within a social context (Rittel and Webber 1973). There are literally no right or wrong answers; perceived problems change as you observe and work on them. As a result, designers need to be solution and user-focused rather than problem-focused. The most designer-friendly data may not be obtained through traditional quantitative methods; rather, designers feel more comfortable with data that they perceive as relevant to particular design projects and data that can easily understood and utilised. Traditional academic research approaches do not necessarily support the needs of today's designer who may not have been adequately educated in the use of research data. In addition, research data generated by others requires significant deciphering, interpretation and application skills, which often leads to confusion and avoidance. This problem can be resolved by educating designers in the personal use of new and more accessible methods for data collection and evaluation.

Product designers have always conducted some research explorations as part of their designing process. Techniques have included benchmarking existing and competing products, shadowing potential users, observation, task analysis and so on (refer to Table 2). In addition, they have explored innovations in materials, technologies and manufacturing processes. They have also used ergonomic and market research data, which has conventionally been generated by
specialists in those respective fields. In recent years there has been a rise of 'evidence' based design decision-making, where demonstration replaces assertion as a means of justifying design decisions. This has resulted in an increasing emphasis on more appropriate and effective research methods, both in industry with designers and design-researchers using a diverse range of research methodologies.

<table>
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<th>Techniques</th>
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<tr>
<td>Brainstorming</td>
<td>Participants suspend reality and share thoughts and ideas (Koskinen 2003, Chambers 2002).</td>
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<tr>
<td>Mood boards</td>
<td>Collections of abstract images that can help communicate emotions and can provide inspiration (Costa et al. 2003, Garner and McDonagh-Philp 2001, McDonagh and Storer 2005, McDonagh and Denton 2005).</td>
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<tr>
<td>Product handling</td>
<td>Exploring products by physically handling them and providing feedback. This method simulates the retail environment (McDonagh et al. 2002, Don and Petrick 2003).</td>
</tr>
<tr>
<td>Product personality profiling</td>
<td>By imaging a product is a person, the participant provides insight into their cultural and social framework (McDonagh et al. 2002, Don and Petrick 2003).</td>
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<tr>
<td>Visual evaluation</td>
<td>This relies on obtaining feedback (and ratings) based on solely visual data (e.g. photograph of product) and simulates web-based or catalogue based purchasing (Dumas 1998, Emmison and Smith 2000, McDonagh et al. 2002).</td>
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Table 2: Sample of conventional designer tools

Academic research models include: (a) scientific and positivist methodologies (quantitative); (b) naturalistic and interpretative methodologies (qualitative), and (c) methodologies from critical theory (Weber 1947).3 The scientific and positivist view is that knowledge is real, capable of being transmitted in a tangible form, and holds universal truths. In sharp contrast to that is the naturalistic and interpretative view, which perceives knowledge as experiential, subjective, and based on experience and insight, thus leading it to be unique and essentially personal in nature (Weber 1947, Cohen et al. 2003). Critical theory intends not merely to understand situations and phenomena, but to change them.

Depending on the nature of the task, the intended outcomes, and their disciplines' conventions, academic researchers choose the most appropriate approach and methods. Table 3 provides an overview of the positivist and interpretative approaches to research. Table 4 highlights qualitative strategies of inquiry. For those who view knowledge as personal, subjective, and unique, a naturalistic and interpretative approach would be appropriate. For those who regard knowledge as hard, tangible and objective, the scientific and positivist approach is more appropriate. Scientific academic researchers collect and analyse data from an experimental approach and can only measure what is measurable and have difficulty handling more that a few variables. Such approaches do not always offer the designer what they need.

2 Evidence within this context refers to data units, which may involve qualitative and often ephemeral material.

3 For the purpose of this discussion, only quantitative and qualitative research methodologies will be discussed. Critical theory is acknowledged by the author, but is considered not directly relevant to design practice, within this context.

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Empathic Design: Emerging Design Research Methodologies

### Research Approaches

<table>
<thead>
<tr>
<th>Dimensions of Comparison</th>
<th>Quantitative (Positivist)</th>
<th>Qualitative (Interpretative)</th>
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<tbody>
<tr>
<td>Definition</td>
<td>A quantitative approach is one in which the investigator primarily uses post-positivist claims for developing knowledge (i.e. cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiment and surveys, and collects data on predetermined instruments that yield statistical data (Denzin and Lincoln 2000, Guba and Lincoln 2000, Stake 1995).</td>
<td>A qualitative approach is one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives (i.e. the multiple meanings of individual experiences, meanings socially and historically constructed, with an intent of developing a theory or pattern) or advocacy/participatory perspectives or both. The researcher collects open-ended, emerging data with the primary intent of developing themes from the data (Denzin and Lincoln 2000, Guba and Lincoln 2000, Stake 1995).</td>
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<tr>
<td>Philosophical basis</td>
<td>Realism: the world exists and is knowable as it really is.</td>
<td>Idealism: the world exists but different people construe it in very different ways.</td>
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<tr>
<td>The role of social science</td>
<td>Discovering the universal laws of society and human conduct within it.</td>
<td>Discovering how different people interpret the world in which they live.</td>
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<tr>
<td>Methods of understanding</td>
<td>Identifying conditions or relationships, which permit the collectivity to exist. Conceiving what these conditions and relationships are.</td>
<td>Interpretation of the subjective meanings which individuals place upon their action. Discovering the subjective rules for such action.</td>
</tr>
<tr>
<td>Theory</td>
<td>A rational edifice built by scientists to explain human behaviour.</td>
<td>Set of meanings which people use to make sense of their world and behaviour within it.</td>
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<tr>
<td>Research</td>
<td>Experimental or quasi-experimental validation of theory.</td>
<td>The search for meaningful relationships and the discovery of their consequences for action.</td>
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<tr>
<td>Methodology</td>
<td>Abstraction of reality, especially through mathematical models and quantitative analysis.</td>
<td>The representation of reality for purposes of comparison. Analysis of language and meaning.</td>
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<tr>
<td>Mixed methods</td>
<td>This approach is one in which the researcher tends to base knowledge claims on pragmatic grounds (e.g. consequence-oriented, problem-centred, and pluralistic). It employs strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problems. The data collection also involves gathering both numeric information as well as narrative information to that the final database represents both quantitative and qualitative information (Denzin and Lincoln 2000, Guba and Lincoln 2000, Stake 1995).</td>
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### Qualitative Strategies of Inquiry

| Case study | The researcher explores in depth a program, and event, and activity, a process, or one or more individuals (Stake 1995, Patton 1990). |
| Ethnography | An inquiry process carried over a prolonged period of time in a natural setting by collecting primarily observational data (Guba and Lincoln 2000, Tedlock 2000, Husserl 1946). |
| Phenomenology | The cognitive reality, which is embodied in the process of subjective human experience. Understanding the 'lived experience' marks phenomenology as a philosophy as well as a method (Denzin and Lincoln 2000, Moustakas 1994, Outhwaite 1975, Clandinin and Connelly 1994). |
| Narrative research | Participants discuss their interpretations of the world in which they live from their own perspective (Lincoln and Guba 2000, Oppenheim 1992, Charmaz 2000). |
| Constructivist grounded theory | Studying people in their natural settings. It assumes the relativism of multiple social realities, recognises the mutual creation of knowledge by the viewer and the viewed, and aims towards interpretative understanding of subject's meanings (Schwandt 2000, Oppenheim 1992, Strauss and Corbin 1998, Hammersley and Atkinson 1995). |

### Table 3: Based on Barr Greenfield (1975)

### Table 4: Qualitative strategies of inquiry

Whilst traditional, quantitative approaches often serve some of the needs of the designer, it is evident that many designers have noticed that supra-functional needs are sorely neglected in much of design research. Segal and Fulton Suri (1997) explain:

Yet in the desire to be accepted by the scientific community, in an effort to be objective, strict and removed, human factors have failed to address an essential facet of human behavior, feelings.
In academia, design research is slowly becoming an established area of enquiry, although it takes a variety of forms. This has been allied in the UK, Australia and Scandinavia and has led to an increase in doctoral activity centred on design, sometimes connected to practice but also for its own interests. The academic design community has been extremely active in the last ten years, exploring such issues as design and emotion, sustainability, design management, mass customisation and so forth. More doctoral design students are entering the community who are able to successfully conduct design research and communicate their research to the design community in a relevant way.

4 Research by Designers

Design practitioners are increasingly spend a significant time in design research. Key examples are Jane Fulton Suri (IDEO), Bryce Rutter (Metaphase), Daniel Formosa (Smart Design), Tucker Viemeister (Springtime USA) and Liz Sanders (SonicRim). Herb Velazquez's team at Kimberly-Clark have developed ‘Consumer Vision’ system (2005), which is a camera mounted on a pair of custom glasses or in a hat or can be used as stand-alone within an environment. As the user wears these glasses (with mounted camera) he or she conducts routine, everyday activities. This is a type of auto-ethnography, an approach that reduces the self-consciousness that may be experienced by the user when being shadowed or video recorded by a researcher. Kimberly-Clark has found that this system has allowed them to gain considerable insight into the user’s life, thus leading to more enhanced intuitive design of their products (their value judgement).

There are a variety of activities that are used in the design process (refer to Table 4) that make up the designer's conventional tool kit. Table 5 highlights a sample of activities that are extending the designer's toolkit to integrate research methodologies and approaches.

<table>
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<tr>
<th>Techniques</th>
<th>Definition</th>
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<tr>
<td>Photographic ethnography</td>
<td>Users or designers capture visual data that can be interpreted afterwards (Emmison and Smith 2000, Laine 2003).</td>
</tr>
<tr>
<td>Auto-ethnography</td>
<td>Data is gathered from a camera mounted on purpose made glasses to capture everyday behaviour in an unobtrusive way (Velasquez 2005).</td>
</tr>
<tr>
<td>Observation</td>
<td>Studying individual members of a culture in depth (Fulton Suri 2003, Abrams 2000).</td>
</tr>
<tr>
<td>User Diaries</td>
<td>Participants record their daily experiences using words and images (Sayre 2001, Hofmeester and de Charon de Saint Germain 2000).</td>
</tr>
<tr>
<td>Role play</td>
<td>Through performance, characters speak about their worlds, express informed opinions and answer questions (Dishman 2003, Laurel 2003, McDaniel Johnson 2003, Burns 2000).</td>
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<tr>
<td>Immersive Experience</td>
<td>The researcher experiences the physical reality of the user through simulation (e.g. disguise and disabling devices)(Moore 2000 and 1985).</td>
</tr>
<tr>
<td>Media Diary</td>
<td>Users record all incoming and outgoing telephone calls, note the television programmes they watched, newspaper they have read and any radio programmes they have listened to (Hofmeester and de Charon de Saint Germain 2000).</td>
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Table 5: Sample of immersive research techniques

It is important to acknowledge the differences between academic and commercial design research. Academic research has to be published for its authors to receive credit, and to acknowledge that it contributes to the body of knowledge within the subject area. More importantly, its utility depends on promulgation. In contrast, the results of commercial design research must improve the design propositions that ensue. The results, and sometimes the
methods, are likely to be confidential. The kudos to the design researchers occurs when the product goes into production and sells well. With these differences in intent and outcome, it is hardly surprising that there exists a widening rift between academic research around design and the expanding research practices in industry. The conventions of writing style, referencing and content required for academic publications and conferences mean that research by design practitioners does not often figure in academic journals. Often the pre-occupations of academic researchers are different from those of designers and the utility of their work to them is limited.

Plowman (2003) explores ethnographic research conducted within both academic and commercial contexts. The following figure (1) presents the overlap between academic and industry with respect to which research tools are employed by each respective type of researcher. The top right hand area represents those used primarily in commercial ethnography.

![Figure 1: Research tools for conducting academic ethnography (Plowman 2003)](image)

It is crucial to understand that designers need both objective and subjective data. Not all designers respond positively to quantitative research approaches; rather they thrive on being immersed and involved within the designing process. Some designers experience creative leaps through intuitive understanding that can lead to successful products even without direct contact with users. It is doubtful that the iMac or the Sony Walkman resulted from extensive market research and user opinion polls. There are severe limitations in simply asking users questions (Mariampolski 1999) because such methods rely on questions being formulated by the researcher, and the respondents being able to express themselves verbally. In more interpretative and exploratory approaches, issues and concerns that affect the user may need to be observed and subjectively understood by the researcher rather than deduced from verbal or written answers to questions.

So why do designers need to embrace more hands-on research approaches to support their designing process? If designers can work directly with users, they can listen to the words and tune-in to the subtle context-focus of the product. The user’s body language, the other products the users surround themselves with, murmurs, and eye movement may prove significant. The intuitive abilities of the researcher can be tapped for the purpose of increased subjective understanding. The following list represents some of the benefits that the author believes can be gained through direct contact with users:

- Verbal and visual triggers and cues can inspire the designer.
- Data is raw and unfiltered. Everything remains present until the designer selects the most design-relevant data.
- It can provide connections between designers and users than can run deeper than the data gathered, and can be rewarding for all parties.
• Visual data can be gathered and digested in real time.
• More reflection on action is possible.

Conducting user research has some challenges and limitations. It can be time consuming, taking designers away from the act of designing. It also requires significant confidence, skill, and expertise to implement it effectively. Designers have a unique role, which consists of translating data into tangible artefacts. Designers need to gather data about user needs that can directly support design processes. As user research has not formed a major part of design education, until recently, designers feel a degree of reluctance towards such activity (Bruseberg and McDonagh-Philp 2002). However, with newer approaches based on ethnographic and ergonomic models proving popular and effective, it is timely for designers to become proactive in further developing their research methods, language and designing protocols.

Design research has benefited greatly from other professionals involved in new product development (e.g. ergonomists, psychologists, bio-engineers, social scientists, market researchers). These disciplines provide helpful insight. But, what makes designers unique is their ability to observe real human activity, allow incubation of their insights and generate visions of the future. Designers gather, digest and interpret data some of which is ephemeral, but they also have the challenge of shaping future experiences.

As existing research approaches and techniques have tended to be developed outside the design domain, few designers felt willing or able to adopt them (Bruseberg and McDonagh-Philp 2002). The author identified that even with designer-friendly research tools, enhanced design outcomes were still not guaranteed. Through assessing a range of phenomenological studies, it became clear that empathy and shared understanding between the designer and user would help provide the foundation by which more effective design solutions could develop.

A study conducted by Ian Storer and the author entitled, “Embracing User-Centred Design: the real experience”, explored what design practitioners perceived to be the benefits of User-Centred Design (Storer and McDonagh 2001). Generally the designers accepted that there were benefits, as User-Centred Design “adds rigour to a fuzzy process of creation”. It also discourages “the ego driven designer concept way of working”. This is also a crucial element to evidence-based design decision making, which supports the designer by enabling a path of action in order to proceed with confidence and reduce the risk of commercial failure. The author acknowledges that designers are visionaries, interpreters of users’ dreams (Sparke 1998); however, there will be situations when a blend of ego and attitude can contribute to generating successful and revolutionary products (e.g. Karim Rashid and Philippe Starck). For most designers, participatory design approaches will prove more effective.

Hofmeester and DeCharon de Saint Germain (2000) produced a valuable publication that brought together a diverse collection of experimental design research methods. These include “shadowing” users, media diaries, and a range of cultural probes, such as asking participants to gather images and take photographs from their personal environments. This eclectic approach to mixed methods produces data that is richer and often more relevant than traditional research approaches. As such, it also represents a significant movement forward for designers. Though this paper does not explore in detail how such methods can be applied, the author recognizes existing, published material that does (Laurel 2003, Creswell 2003, Langford and McDonagh 2003).

5 The Development of Empathic Design Methods

Designers cannot rely on only their own experience, background and education to inform their design decision-making. Only a small part of knowledge originates from personal experience (Schutz 1970); it is greatly enhanced by shared understanding during communication. Designers need to be cognisant of the fact that there are natural boundaries to their understanding,
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One's empathic horizon (McDonagh-Philp and Denton 1999) can be seen as a measure of an individual's ability to empathise with those beyond their immediate socio/economic group, and can be expanded by reflection, experience and research. Designers can increase their awareness of issues of particular groups even though the process of extending one's knowledge and understanding can involve a degree of discomfort. Taking designers outside their comfort zone is a fundamental part of gaining empathy and real insight, and there are short and long term benefits to be gained. In the short term, by being involved directly in research for a specific design project, the designer obtains useful data and stimuli, culminating in better understanding and empathy for a particular user group. In the long term, designers using this approach can develop an increased ability to collaborate with other user groups and become more adaptable, far-reaching and effective.

This emerging model of empathic design research supports User-Centred Design and helps to develop it considerably further (refer to Figure 2). This methodology is grounded in the experiences of the user, which, combined with the researcher's understanding of the phenomena, is the essence of qualitative research. Once designers gather a variety of textual, verbal, and visual data through in-depth, multiple interviews and observation of users, an incubation period follows that provides designers the opportunity to reflect and allow thoughts and feelings to develop. These typically take the form of connections, patterns, design triggers, and creative thoughts. Unlike traditional researchers, designers need to transform this type of data into information that will form the basis of concept generation. This process involves imagining a design solution/outcome that may transcend what already exists, and this may require designers to suspend reality in order to develop more visionary ideas and concepts. This model emphasises transformation within the designer in order for empathy and deep understanding to develop.

Empathic research methods are inherently user-centred (Koskinen 2003). Fulton Suri understands empathy as "our intuitive ability to identify with other people's thoughts and feelings - their motivations, emotional and mental models, values, priorities, preferences and inner conflicts" (2003), while the Oxford English Dictionary defines empathy as "the ability to understand and share the feelings of another." Fulton Suri (2003) also believes that empathy "... is simply about
achieving greater awareness, an extended imagination and sensitivity to another person’s world in a powerfully memorable way.” Plowman (2003) professes that empathy is “the altered subjectivity that can come from immersion into a particular context,” a view that is helpful for designers learning about human communication during the design process. According to Hoffman (2000), empathy is “[the] effective response more appropriate to someone else’s situation than one’s own.” A positive outcome of the empathic design research approach is that it can allow for recognition of both functional and supra-functional needs, thus providing depth and breadth for researchers who need to employ a variety of mixed research methods in a multitude of contexts.

User-data can be captured and translated to reveal a reality that may not be apparent on first analysis. Through empathic understanding, the designer can begin to create a holistic picture that places the user and product within a wider context. Qualitative research recognizes that everyone views themselves, others, and their environment through a particular lens, which can be defined and interpreted by study. An understanding of these various views offers designers unique insights, particularly when emerging issues create more questions to be answered. It is no longer necessary for designers to base their design decision-making on objective data alone when an empathic research model allows for more subjective understanding that can help fuel the intuitive aspect of the creative design process. With the increase in users’ expectations, needs and aspirations, empathy becomes a necessity rather than a luxury.

This approach asserts that designers can no longer afford to be passive consumers of data collected by others. They must be proactive and creative in generating design relevant information through closer, more intimate and collaborative forms of dialogue, which must be nurtured between designer and user. According to Sun Yat Sen (1866-1925), ‘To understand is hard. Once one understands, action is easy.’ Due to the fact that designers are now working in increasingly diverse communities, this approach will become crucial to the development of an ability to empathise with a variety of participants.

6 Implications for Design Education

In Design Education students are encouraged to conduct group work and become involved in team projects, often including a number of disciplines to simulate the ‘real world’. In taking this further, student designers need to fully comprehend the challenges they will face when collaborating with users. It will be time consuming to gather, interpret and allow the experience to incubate. The act of conducting research with participants requires relatively sophisticated communication and organisational skills. It often proves difficult to do this properly in an educational context with pressures of time, cost and the demands of the rest of the curriculum.

A study conducted by the author revealed that designers may perceive such research activities as taking them away from what they ‘should’ be doing, that is designing. Design students need to have the benefits made explicit to them before they are likely to adopt and employ design research methods (Bruseberg and McDonagh-Philp 2002). Developing sensitivity to the supra-functional aspects of products must start early. The techniques of reflective learning (Brockbank and McGill 2003) and reflective practice (Schön 2003) can assist in helping students achieve a deeper level of learning. This also increases their sensitivity to the users’ experiences and, importantly, their ability to raise and discuss these issues in a team situation.

Students are often actively encouraged to involve users within the design process to support more effective and relevant outcomes. The following (Table 6) illustrates a range of immersion techniques that can help nurture empathy between the student designer and user. User participation does not, in itself, guarantee successful design outcomes, but it exposes students to real people with real experiences. Design students who generate their own research data can more readily justify their design solutions. Using film clips, photographs of users and interviews with users help provide insights and by highlighting user needs (McDonagh-Philp et al 1999), thus enabling transformation and growth in design students.
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The empathic design research model discussed in this paper offers a promising route by which design students can develop strategies to gather and utilise data that supports their design process. While a prescriptive course of action, defining which research techniques to use is not the focus of this approach, it does highlight a crucial need for immersion, personal contact and deep learning (Entwistle and Ramsden 1983). This is a transformative process, the importance of which cannot be understated in design education curricula. For many students, the study of Product Design is motivated by a desire to design cool products “for me, and people like me”. Empathic design extends that activity to include other people, more so as students’ abilities to empathise increases and their empathic horizon expands.

The author recognises the importance of ensuring that the research activity is relevant and relates to professional practice (Denton and McDonagh 2005). It is important that Product Design students develop appropriate skills to enter the current and future job market. These skills should now include research methods. Ideally, design research would be conducted within the natural environment for the task and the user. However, this may not be possible within an academic context, but there are still many benefits to be gained by conducting user research even though the conditions may be less than ideal. Students will ultimately learn to apply these methods to professional practice.

The expanded role of design research in general has not yet been fully integrated into the undergraduate curriculum. For some educators there may be some resistance to changing the existing curricula to accommodate design research approaches. After all, it is difficult enough to prepare students within a 3-4 year time frame. Empathic design research methods can be integrated ‘organically’ so that a balance is created between research and the design process.

7 Conclusion

Design is at a critical point in its evolution. Social, cultural and personal values are shifting and the well-established icons of design – brands and products – are losing their allure. Consumers are searching for more personal connections to the products they use, and they have more information and choices than ever before. As a design community, we need to be active in developing research strategies that build empathy and shared understanding between designers.
and users, thus ensuring that the quality of research data is improved for the designer. Empathic design approaches are one powerful way to collect and interpret new data, in a way that significantly enhances the design process.

Meaningful experience in empathic research methodology for Product Designers is directly related to the quality of self-learning and reflection by the individual designer. Immersion and empathy give designers a clearer appreciation of the users' experiences so that new patterns of behaviour can be made visible. The direct experience that empathy simulates, that is, feeling how others feel, contributes in an extremely positive way to the designing process. We need to become designers who work empathically with our users to ensure that our design outcomes will enhance everyone's world.

References


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Deana McDonagh © 2006


McDonagh D and Formosa D (2004) To be honest, I wasn't that comfortable anyway... *6th International Conference of the European Academy of Design* (March 29-31) 2005, University of the Arts, Bremen, Germany.


Supra-functional needs
(1) McDonagh-Philp D and Lebon C (2000)
The emotional domain in product design.
*The Design Journal* 3 (1) pp.31-43.
Consumer products fulfil a variety of needs. Products do not exist to merely perform tasks, they satisfy other functional requirements. These include aspirations, cultural, social and emotional needs. There is currently interest in the emotional relationship between a product and its user. It is important that the designer can empathise with specific user groups in order for their designs to create this emotional relationship.

User-Centred Design is concerned with more than functional issues. Major manufacturing companies such as Sony, Philips and Apple Macintosh are already applying responsive design methods to meet perceived consumer needs. How is design education encouraging prospective designers to engage with User-Centred Design strategies and methodologies? How can such strategies and methodologies be incorporated into the curriculum to help students imbue a new product with qualities that implicitly reflect the emotional needs of the target consumer? This paper discusses soft design, and then examines some of the ways in which the undergraduate product design programmes at Loughborough and Staffordshire Universities are tackling this aspect of design studies.

INTRODUCTION

Product design education is expected, to some degree, to reflect current practice in professional design. With this in mind, product design courses are currently running pilot projects and modifying existing modules to incorporate User-Centred Design strategies and methodologies. The authors perceive User-Centred Design as an approach that involves user participation at various levels within the designing process, from research to evaluation.
The paper examines some concepts which design education is trying to build into its curriculum. 

Extensive User-Centred Design methods of working have been documented in areas such as architecture, environmental design, ergonomics and product design where emotional aspects have been touched upon implicitly. In 1984, Ingram discussed the relevance of user experiences and two specific techniques, evolutionary mock-ups and user trips, as part of a designer's strategies. Over the past decade there has been a paradigm shift from market push oriented design towards products that enhance 'quality of life', making this an area that is critical for product design. 'Quality of life' is a major theme within the research programmes of the European Union. A major conference used this expression as part of its title in June 1998. 'Quality of life' is an issue that is being explored through a number of avenues such as gerontology, sociology and marketing. The importance being put upon the notion of the 'quality of life' is pushing the need for the designers to recognize it as part of design criteria. To successfully provide relevant design solutions, which reflect 'quality of life', designers need to engage with the emotional relationship between product and user.

Changes in designing processes have taken place, within professional practice, due to the application of User-Centred Design methodologies. It is through this user involvement that the emotional context of a product can be considered within the designing process.

**DESIGNING PROCESS**

The addition of User-Centred Design to the curriculum requires an examination of its place in the designing process. 'User-Centred Design is a design methodology that utilizes users as a designing resource to increase understanding of the user.' (McDonagh-Philp, 1998)

Practising product/industrial designers do not tend to have a formal model which they adhere to when designing. There are elements that are common but each individual designer will put together a process that utilizes their particular skills and abilities, directly meeting the requirements of the unique quality of a particular design brief. Design students are taught to follow a generic process, which provides a framework for their creative development. This then becomes enhanced through the actual designing activity and their experience of different design briefs.

![Figure 1. Adapted Ulrich and Eppinger Conventional Design Model.](image)

Attempting to formally commit the design process to paper is uncomfortable for a designer. This is largely due to the iterative process of designing. Practising designers have recently been working towards recognizing the appropriate points at which to plug in 'User-Centred Design' strategies (DesignAge: Working with Users Group).

Figure 2 overleaf attempts to illustrate a designing process based upon professional experience. Underpinned by the conventional framework, the authors have expanded this to incorporate some of the qualitative aspects that are now being demanded by consumers and clients. This incorporates valuable design-related activities such as cultural awareness, user emotions, designer emotions and client emotions. The authors, to highlight the points at which emotional considerations come into play, have reviewed a model of designing. These activities have no specific linear direction.
2. Designing process with emotional considerations.
and are intentionally illustrated in a random manner.

Figure 2 has also taken into account the 'down time' needed by designers to process and reflect on information. This need was expressed by Jessell (1997) when she was explaining the way in which designers process information:

‘Not only do we as designers prefer soft information; we prefer information in little bite-sized chunks. We need time to dream, let our imaginations explore the implications of what we have taken in. We also need translation time.’

Hence the inclusion of reflection, suspend reality and non-design activity in the matrix.

The Presence Forum explored a variety of user issues that did include the intangible aspects of product value. Within the forum, Gaver, Dunne and Pacenti (1997) used the motto 'inspiration not information' as the basis of the 'Cultural Probes' project. They were 'concerned to go beyond factual data to an understanding of their emotions, aesthetics, and desires.' Burns, Dishman, Verplank and Lassiter (1997) concluded that 'By designing in an interactive way we were able to build an increased empathy for the people that we had identified as the users we were designing for.' The Presence project group expressed a desire to increase the satisfaction of the user, especially in the field of interface design, and top of their list of qualities was 'pleasurable devices, considering the aesthetics of the interaction as a major element to be developed in tandem with functionality.'

The relationship that a consumer has with any given product alters through use, familiarity and need. Such contributory factors of satisfaction are variable. The following figure illustrates the stages of value and consumer behaviour toward products. Understanding consumer behaviour on a variety of levels enables the designer to respond to the mutual interdependency of the consumer and the product.

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**Figure 3. Product's lifecycle (Panzar and Koskijoki 1996, p. 142)**

For designers, a clear understanding of the types of product consumption can be aided by adopting User-Centred Design methods. It is possible from the chart (Figure 3) to see that concepts such as luxury wonder, experience and pleasure relate to issues that User-Centred Design tries to address. This particular example is an attempt to explore the relationship between the activity of consumption and the functions of the item being consumed.

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**EMOTIONS**

At this point it is appropriate to examine the emotional context of products.

'...All goods carry meaning, but none by itself...the meaning is in the relations between all the goods, just as music is in the relations marked out by the sounds and not in any one note.' (Douglas and Isherwood 1979, pp.72-73)

Emotion may be defined as an 'inner experience'. Each individual experiences emotional attachments to objects in a unique way. Each individual will have a different experience
of that object and different memories, which give that object significance.

'In a so-called postmodern world, an individual may lose his or her subjectivity amidst the plethora of lifestyle choices and yet the society in which he or she lives puts considerable emphasis on the uniqueness of each and every person.' (Miles, 1998, p.30)

Manufacturers such as Philips, Apple Macintosh and Sony have identified these qualitative aspects as being crucial to a product's success in the market. The product's language (product semantics), emotional bonds and cultural significance contribute to a consumer's relationship with any given product. This is an area that designers have recently been asked to address by clients, so explicitly changing the model of the designing activity (Figure 2).

Designers as experts are not typical users, but often think of themselves in that way (Norman, 1988, p155).

The danger for designers comes when the client is not the user either and decisions are based on assumptions. It is especially prevalent in the electronics gizmo world.

'Steve Wozniak, the whiz-kid co-founder of Apple computer offered the first public glimpse of CORE, his latest brainchild. "CORE, which stands for controller of remote electronics, is a single device that allows consumers to fully operate their home equipment by remote as long as the equipment is all in one room...." CORE comes with a forty page user-manual. But Wozniak says users of his gizmos... won't be daunted because initially most will be "techies"'. (Los Angeles Times, '1987, in Norman, 1988, p.155)

The above quote demonstrates the way in which commercial imperatives can lead designers to neglect the needs of the eventual users. This dilemma manifests itself in inappropriate designs that may provide usable and functional products, yet fail to satisfy the qualitative needs of the user group.

The product design fraternity consists generally of a sub-culture of individuals with similar backgrounds, gender (Chartered Society of Designers, 1996) and age. It is unreasonable to expect a designer to have experience and understanding of all user types within the shifting demography. Designers need to employ a variety of methods to fill their knowledge gap and gain the empathy required to deal with user groups outside their own experience.

Designers are going to need to become more directly involved with the research elements of the designing process. For designs to be effective in the cultural and emotional context of a given user group, their needs and wishes need to be thoroughly understood. This level of understanding extends the research dimension of the designing process (Figure 2).

Extended design research can produce targeted information about the soft functionality of the required product leading to better-informed design briefs. This is because design briefs will be based on the real and perceived needs, wishes and desires gained by interaction with a user group. The work of Boess and Lebbon (1998) demonstrates the benefits of eliciting responses from the emotional domain of a particular user group. Through direct contact they were able to establish what a group of older people considered would be beneficial to their wellbeing.

'I really enjoy just lying down and having a good soak. What bothers us most is getting up, it's difficult. I don't have any help. You've got your own dignity then, haven't you? My ideal bathroom is a mix of the old with the new: Minton Hollins tiles and a shower' (Barbara, aged 82).

(Boess and Lebbon, 1998, p192)

The problem in this approach, for the designer, is that it is a long process, which may appear to be distant from the creative thrust of the design project. A designer may also
feel creatively restricted by the information provided from this type of research.

"Emotions create your being..." (45-year-old man) (Lupton, 1998, p. 41)

The emotional domain of product design and the relationship between users and products provides ample opportunity for further research. A critical consideration is how to access users' own understanding of this relationship, and, once the users have expressed themselves, how the designer can then understand and integrate this knowledge into the designing process.

It is important that designers communicate with users in a way in which is familiar to them (Lincoln and Guba 1985, p20), but which then allows the users to communicate to the designer in their terms, using language that may encourage more information-rich feedback. Through User-Centred Design methods and strategies, the proactive designer can respond and adapt to the ever-changing target user groups.

By extending the designing process chart, it is possible to further consider the whereabouts of soft functions such as emotion and other qualitative issues in relation to other aspects of design. This partly reflects the work carried out by the Design Age Network (DAN) User Group on the position and timing of user involvement in the design process.

People and organizations are being proactive in this area, and raising the awareness of the soft functional issues. Designers currently being trained at undergraduate and postgraduate level at a number of educational establishments are being exposed to working with real users.

- DesignAge (at the Royal College of Art) offers a competition for postgraduate design students and supports them through holding regular user forums. They founded the Design for Ageing Network, which is an international group of designers who collaborate on age-related design projects; it has worked with the Royal Society of Arts (RSA) to develop a teaching pack for design education establishments.

- The RSA offers, as part of its Student Design Awards, a New Design for Old brief that requires an entrant to engage directly in research with users as a strategy for design and to make this explicit in the submission.

- The Netherlands Design Institute holds a database of case studies sharing best practice; hosts the Doors of Perception conference and recently supported a project culminating in a publication Eternally Yours: Visions on Product Endurance.

- Loughborough, Salford and Staffordshire Universities have integrated User-Centred Design approaches into undergraduate and postgraduate degree curricula.

- The University of Art and Design Helsinki UIAH successfully piloted an international postgraduate Design For All project in 1997.

- In June 1998 in the USA, the International Conference on Universal Design, Products and Environments was run concurrently with the Fourth Annual Universal Design Education Project Forum. The accompanying exhibition showed student projects ranging from telematics and smart card technology-based designs to transit shelters and architecture.

This is not an exhaustive list. It represents recent examples of activity at different types of institutions across Europe.

**USER-CENTRED DESIGN**

"Because design has popularly become associated with self-conscious styling for the purposes of marketing products, it is often perceived as trivial." (Attfield and Kirkham, 1989, p1)

User-Centred Design is a term often used to cover a plethora of design methods and strategies (Figure 4) that attempt to address the needs and aspirations of users. The
following approaches are currently employed to overcome the trivialization of design.

**RECOGNIZED USER-CENTRED DESIGN STRATEGIES**

Designers seem more comfortable with action research methods than theory-based methods. They prefer role play and anecdotal data-gathering processes, working more directly with user groups to elicit responses to design concepts. Sometimes user feedback is sought too late in the design process. It is often used as a verification tool rather than a way of supplementing data collection and developing an appropriately focused design brief.

Users desire products that make a difference to the quality of their everyday lives. Products that enhance daily activities do not necessarily have to be high cost, high technology objects. High value is not the same as high cost. The whole value of the product to the user is greater than the sum of its parts.

User satisfaction from a product may be made up from several factors, including the following.

- **Aesthetic appeal**: viewed within a cultural context by the individual consumer therefore not always matching the aesthetic preference of the designer
- **Taste**: a definite cultural construction which designers should not ignore on behalf of their client and the consumer, especially within a multicultural society
- **Usability**: ease of use when interacting with the product;

**Products are worthless without the ability to communicate how they perform their function**

(Krippendorf, 1990, p17)

- **Materials**: the physical (e.g. appearance, texture) as well as functional qualities
- **Sensory**: experienced through flavour, scent, sound, vibration, touch and colour.

For further clarification and in order to differentiate between the types of functionality, two types of functionality will be described: hard and soft functions.

**Hard functions** include how it works, what it does, construction and materials. **Soft functions** include intangible qualities such as emotional bonds, familiarity aspirations, desire, sentimentality, aesthetics, personal taste, touch, smell, feel and personality.

**Soft functionality** should be considered for all artifacts from one-off production to mainstream products, for example toilet seat to objet d'art. Common activities of daily living are the ones that need enlivening. No task carried out daily should be devoid of pleasure, delight or enjoyment. Many daily tasks are made irritating and laborious due to the lack of consideration of the soft function.

**Soft functionality** cannot be simply applied like a gloss. It has to be inherent within the design concept. It will only add value if it is culturally and emotionally significant to the target audience. Examples of the soft function of personality can be recognized in products such as Philips Sunrise toaster and the new iMac computer. The Philips Sunrise toaster demonstrates a product that welcomes the

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**Figure 4.** DesignAge Teaching Pack (Hewer, 1996).
user and produces a feelgood factor, by its use of form, colour and its simplicity. The iMac is one of the first computers to be given a personality. There have been reports of owners giving them names.

The designer developing the ability to recognise people's wishes and desires can achieve an empathetic approach. Familiarity, affection, memory, sentimentality, personal taste are aspects which designers will need to explore, as these are the type of soft values which users assign to the products they interact with. As Lebbon explained in the ‘Everyday Story of Bathroomness’ (1997). 'Auntie Jess will not part with her 1950s Lemon Yellow Bathroom', even though she finds it impractical to use the bath any more and a shower would suit her physical and hard function needs better.

In a current pilot study (McDonagh-Philp, 1999), users, employing a variety of User-Centred Design methods, explored small domestic appliances (kettles, toasters and coffee makers). The initial findings indicate a gender difference in the initial user interaction and evaluation of these products. While the women took a considered approach to the products, the men were more immediate in physical interaction. The women generally perceived the products within a personal context and offered design solutions to any undesirable parts of the products. The men took a negative critical stance in their evaluation. Women expressed their view of the products in more emotive language, while men used more hard functional terms. This is confirmed by the results from the 'Well-bathing' project. Boess and Lebbon found that 'More women than men tended to wish for the bathroom to be a regenerational, cosy, private place. More men than women tended to see it as a purely functional place.' (Boess and Lebbon, 1998)

Familiarity is quite significant in terms of soft function. People tend to learn how to use a product more easily if they are building on previous experience. This is a basic tenet within educational practice and is one of which designers might usefully become aware. There are times when this would not be an effective approach, such as with the design of a video cassette recorder remote controller, but it might be a useful guide when introducing other technology-led products (Jordan, 1998). Computer software is an example where this has happened; both Microsoft and Apple Macintosh have understood this, adapting previously successful interfaces in the design and development of new products.

Emphasis is changing from hard functionality to soft functionality especially in the design research stages of new product development. Scenario-based design research has been practised in the USA and the UK for last 30 years, by design consultancies such as IDEO, Loewy and Smart Design. Some practitioners have taken it further to experience user emotions, for example Patricia Moore. This leads to more thorough research supported by a wider variety of methodologies that target particular aspects of a product's function. By incorporating more empathetic research, prior to concept generation, the designer can work towards the integration of soft functionality.

One of the most difficult areas for designers to research is the emotional experiences and needs which users have in relation to products. The approach recommended by Alexander in his study A Pattern Language (1977) develops solutions which are founded on the premise of providing a supportive environment reflecting people's cultural, emotional and psychological needs as well as physical ones.

UNDERGRADUATE DESIGN TRAINING

Designers use mood boards to express the essence of the product, the user or the user's environment. This is a vehicle

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by which a designer can begin to uncover the emotional, soft functional issues of a project brief. It is an essential part of a designer's training to learn to construct and decode such visual material. Tahkokallio (1998) points out that shared expertise and the acceptance of the value of purely subjective and emotional experiences is a necessary preliminary to concept generation in a Design for All (User-Centred Design) context.

The assignment challenged their ability to explore the semantic quality of products. Each student was given an adjective at random (e.g. scary, friendly, inviting, tasteless) and a mainstream consumer product (e.g. telephone, toaster, alarm clock). The challenge was to explore the semantic issues of combining the adjective with the product type (e.g. scary telephone) and to devise an appropriate concept for the product.

Students are asked to gather images, which simply evoked the descriptor word, sometimes literally or often abstractly through materials, colour, form, emotions etc in an attempt to capture the essence of their descriptor word. (McDonagh-Phillip and Wormald, 1999)

Figures 6 and 7 illustrate the students' initial visual expression of certain words followed by their final design proposal responding to the emotional product. The resulting design work reflects the decoding of the visual stimuli and its application as a defining element for a User-Centred Design approach. The students were able to express emotion and soft function in their design concepts and demonstrated their understanding through their design proposals.

At Staffordshire University, User-Centred Design has been approached in another context with the introduction of 'action research' into the Human Factors module in year two of the BA Hons Product Design course in 1998. The module was based on experienced gained from the Well-Bathing Project (Boess and Lebon, IDATER 1998) and was an opportunity to take the results of design research directly into the undergraduate curriculum. During the pilot run of the module there were 7 participating male students, average age 20 years. They were linked to a group of 7 members of the local unit of the University of the Third Age (U3A). This group was made up from three couples and one single woman, whose mean age was 67 years.

The brief for the students was to develop a `useful

Figure 5. Example of a mood board.

Design is taught as a multi-disciplinary profession and hence students are confronted with a combination of design issues, technology, skills and information to assimilate into their design activities. Curriculum development of the Industrial Design and Technology undergraduate programmes at Loughborough University successfully incorporates design projects that develop User-Centred Design approaches. This subject, one of human values rather than black and white technology, is currently important to industrial designers and is seen as an appropriate issue for students to address. Visual creativity, partly the ability to tackle design problems from a purely visual standpoint, is believed to be crucial to addressing semantic issues in products. A recent project, tackling the issue of product semantics, concentrated on breaking down barriers to students' creativity in order to increase their understanding of product meaning.

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bathroom' based on design guidelines, standards and given ergonomic data, which had to fit into a nominal British Standard bathroom. The usefulness had to be defined in collaboration with the user group. Through this user/designer team approach it was possible to define three major areas for design opportunity:

- grooming at the washbasin
- storing, reaching for and using toiletries
- manoeuvring within the space.

The Well-Bathing study had proved the importance of triangulation of data sources, so this was built into the structure of the module. Students were introduced to various action research methods, such as observation and interviewing and taught methods for analysing the results from qualitative research data. They were required to gather data from available standards and evaluate this in the context of a manufacturer of bathroom sanitary ware and with the user group, using a full-size test rig. Bringing together the demands of the brief and users' comments like 'I want a bath like this' obliged the students to rationalize, prioritize and defend their decisions to users and lecturers. By building full-size test rigs they were able to verify abstract data with the user group. The project was successful in challenging the students and promoting effective experiential learning and collaborative work. Coleman (1997) has noted: 'I know of no better way of challenging students' preconceptions than putting them face to face with a group of older people.'

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**Figure 6. Student initial responses to selected words.**

**Figure 7. Presentation of design proposal based on the selected words.**

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**SCARY TELEPHONE**

**Friendly Toaster**

**Industrial Alarm Clock**

**Classical Toaster**
At the end of the project the students evaluated their experiences, which on the whole were positive. The students realised that they, themselves, were experts and gained confidence through their interaction with the user group. Students and users found common ground in their dislike of 'special' or 'assistive' products. They were able to recognize the benefit of working directly with the users and understood that this type of collaboration need not necessarily cramp their creativity. There were, however, some negative points raised in the evaluation. Some of the students said that they did not like designing bathrooms or designing for older people. In the follow-up project, to design a washstand area, only one of the students applied a user-centred approach.

The cohort of students is now in its final year of study. They were asked recently what they thought was the most valuable experience from their second year, one that they would transfer into their major project work. The majority said that what they had experienced during the Action Research Module would be the most useful in the development of their major projects. They felt that they were better prepared for their place in the design profession and would know how to design for tomorrow's smart consumers.

CONCLUSION

It is important to consider whether we are any nearer to an answer to the following question - how are designers going to produce design solutions that are socially and culturally responsive to the needs of these groups of whom they have little or no experience? Designers need to adopt strategies for accessing the emotional context of the products that they have to design for the people who will use them. With design briefs being unique, designers cannot simply use prescribed methods to overcome their lack of experience. They should aim to adapt and modify methods that suit the particular combination of the brief and target user. User-Centred Design does not provide a prescriptive method of working. It offers a variety of strategies and approaches that relate more closely to the way in which product designers work, building upon their existing skills.

Design educators need to develop teaching strategies that enable student designers to engage with the issues currently being explored by professional designers. Collaborative projects between students, designers active in the User-Centred Design, user groups (such as U3A) and manufacturers, bring credibility to the educational programme. Students respond well to the challenges brought to them by external contributors.

Student designers can learn how to develop empathetic design skills by being introduced to User-Centred Design strategies and by being given the opportunity to work on design briefs that emphasize the soft functions of a product. This prepares the undergraduate student designer to meet the exacting demands of their clients, who are already aware of the emotional context of product use, and fulfil the desires of those consumers who demand more than hard functionality from the products they use.

Consumption is, after all, an enriching experience. (Koskiikon 1997, p.143)

The exploration of the role of emotions is ongoing. Within this paper the authors have described their own experience through their work with student designers and their research activities. Reflecting on their practice, the authors feel that further exploration through examining the relationship between client/developer emotions and those of the user would extend the knowledge. Knowing which set of emotions is dominant at what point in time during the product development process would support design decision-making. This is now being developed further.
through two separate funded research projects (EPSRC: I-Design and AHHRB: Development of Focus Groups to Support the Designing Process).

REFERENCES


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New product development by eliciting user experience and aspirations

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Industrial design training is embracing the need for designers to elicit user needs in order to support the development of successful new products. This paper highlights the collaboration of an ergonomist and two industrial designers in the development of a range of mainstream domestic consumer products. It documents the experiences gained in applying and adapting focus group techniques to inform the designing process directly, and illustrates how a variety of techniques (e.g. product handling and product personality profiling) can be incorporated to elicit user needs, aspirations and emotions.

KEYWORDS: industrial design; focus groups; user-centred design; design research.

1. Introduction

Designers cannot be knowledgeable about all the different types of users they design for, and the experience of use for all the different product types they aim to create. Moreover, our environments, work and home are filled with artefacts that satisfy needs beyond the functional, such as the aspirational, spiritual and emotional (McDonagh-Philp & Lebbon, 2000). Carrying out user research enables designers to expand their empathic horizon (McDonagh-Philp & Denton, 1999) and extend their knowledge according to specific design tasks. Users are a valuable source of primary information in assisting designers to understand the real needs for the design of products, and, it is hoped, to ensure commercial success.

Whilst the task of industrial designers/new product developers is traditionally one of shaping fashion and providing novel solutions, it is increasingly accepted that this task is enhanced by consulting the potential users of new products. The incorporation of user needs into a design is challenging, as gathering and analysing such intangible and qualitative data requires considerable skill and expertise. With conventional industrial/product design training, undergraduates often do not have the opportunity to obtain and/or develop such skills. Providing designers with means of accessing user information directly, without filtering it through a market research department, can support evidence-based design.
This paper describes and discusses the experience and expertise gained from a research project funded by the EPSRC. It aimed to develop techniques that can be applied by designers, or in close collaboration with designers, to make user knowledge more accessible during the designing process. Building on previous design research projects, it enabled a variety of techniques from various disciplines (social sciences, human factors and market research) to be employed, evaluated and adapted to support designers. It drew on the collaboration between an ergonomist, a design-researcher (trained as an industrial designer and lecturing in industrial design) and a consultant industrial designer. It aimed at the development of techniques to facilitate communication between designers and users, primarily through the adaptation of focus group techniques for designers. Small domestic kitchen appliances (e.g. kettles) were chosen as the product area to focus on, due to their accessibility and users' familiarity with such mainstream products. The project involved a total of 74 participants (average age 40, 29 males and 45 females). The majority of the participants were home owners and in full time employment. The research sessions were all conducted in the East Midlands, England.

2. Focus groups in design research and human factors research

2.1. DEFINITION, SCOPE AND CHARACTERISTICS OF FOCUS GROUPS

Focus groups are a purposefully selected assembly of individuals to take part in a group discussion. A moderator (a chairperson or "facilitator") leads the group through a number of topics and activities. The group concentrates on a particular set of issues or concerns. It relies on a common interest between the participants—because the synergy between the discussion contributors provides data through sharing and comparing knowledge, rather than individual questioning. Focus groups provide qualitative data—hence the results cannot be quantified or generalized. Such findings cannot represent the whole population. The information gained consists of backgrounds for behaviour, and opinions, rather than statistically secure data (Morgan, 1998a).

Focus groups are a well-established technique in market research and have a long history in informing both requirements specification and prototype evaluation, as well as human factors research and usability evaluation. More recently, social science research has adapted the technique as a valuable source of data and information. Much of the procedural literature available to support the application of focus groups, such as Morgan (1998a, b), Krueger (1998a–c), and Greenbaum (1998), is thus tailored for social scientists or market researchers.

Focus groups are a flexible technique. The scope of application is wide. Within the field of human factors a range of different product areas has been investigated. Because of the qualitative nature of the data generated, the technique is particularly suited to exploratory research, or for examining quantitative data in more depth to provide additional insight. Users are encouraged to be spontaneous and can bounce ideas off each other. Questions with an open-ended nature can be explored. The technique can be used at any stage in the designing process (requirements capture, discussion of designers' ideas, or prototype evaluation). Group members might contribute potential design
solutions. Focus groups enable designers to elicit user needs for the design of pleasurable products—thus helping designers to empathize with user aspirations beyond the functional (Jordan, 2000). Burns and Evans (2000) suggest designers could partially adopt a market research role at a very early stage in the designing process—to be able to not just satisfy future customers but to delight them.

2.2. FOCUS GROUPS FOR DESIGNING

Practising designers will benefit from a close collaboration with design researchers, or from carrying out design research themselves. This is likely to change the character of the design profession to some extent, and in particular design training. In order to understand the needs of designers as future users of the techniques, the authors (1) examined the suitability of focus group techniques to support the designing process, drawing on current literature (McDonagh-Philp & Bruseberg, 2000a); (2) investigated the perceptions of designers through questionnaires and a series of interviews with practising designers (Bruseberg & McDonagh-Philp 2000).

Through consulting with designers it became apparent that design practice is extremely flexible and diverse—due to the nature of different projects and varying types of products, as well as the preferences of individual designers. There is no prescribed way of working and collaborating for designers, conventionally they work on their own, but there is a shift towards involvement within multidisciplinary teams.

The design methods used currently tend to be informal. Hence, user-centred design research methods should be adaptable to a range of design approaches and take account of the intuitive nature of designing. There were a number of pre-conceptions against a close collaboration with users (e.g. "...what would then be the role of the designer?") whilst the demand for more information about user needs was present at the same time. Likewise, a long, formal list of rules and user requirements based on standard market research was perceived as restrictive.

Conventionally the direct involvement of designers into user research is limited. The importance of a close collaboration between designers and researchers is often stressed (e.g. Donnelly, 2000). Only a few sources advocate the presence of designers in focus group sessions as observers (e.g. Wilson & Callaghan, 1994), or suggest that designers should do the following.

- Take part actively in the discussion groups (Caplan, 1990; Sato & Salvador, 1999).
- Work directly with users in participatory workshops (Burns & Evans, 2000).
- Act as a focus group moderator (MERCI, 1997).

Carmel, Randall and George (1993) highlight the benefits of the creative capacity of designers when taking part in participatory design workshops. However, no studies have as yet, to the authors' knowledge, addressed specifically the benefits and practicalities of an active role of designers during focus group activities for design research.

The main objective of focus group research, for designing, is to encourage communication with users. This particular application of techniques (a) enables designers to work collaboratively with ergonomists and design researchers, and (b) changes the focus of designers to considering user needs.
Preparing and conducting focus group research requires a variety of different activities—please refer to McDonagh-Philp and Bruseberg (2000b) for more details. Although focus groups are a relatively efficient technique, the time and effort required to prepare the research should not be underestimated.

2.3. COMBINATION WITH OTHER TECHNIQUES AND MODIFICATIONS
Many researchers prefer to combine focus groups with other techniques—either to validate the results through other types of data (e.g. Zarean, Sivanandan & Warren, 1994), or to link in with other studies at different stages of the research/designing process (e.g. Wilson & Callaghan, 1994). Data analysis benefits from triangulation—viewing a phenomenon from several perspectives (e.g. various techniques, individual peoples' interpretations). Combination with other techniques (e.g. video simulations, questionnaires) can support the discussion or add insight through a variety of additional activities (e.g. Hone, Graham, Maguire, Baber & Johnson, 1998). Several authors report the use of scenario techniques in helping to understand the variety of ways in which users interact with new products (e.g. Sato & Salvador, 1999). Sessions may be conducted to retrieve feedback from earlier product performance testing by users (Caplan, 1990).

Group-based design-research methods have evolved towards participatory design methods—where users take an active part in the designing process (e.g. Burns & Evans, 2000). These sessions are often called participatory workshops, or may extend focus groups through creative activities (e.g. drawing, use of 3D modelling).

2.4. THE CREATIVE POTENTIAL OF USERS
The underlying aim of the project discussed within this paper was to enhance the lifestyle of people by providing products that fit user needs more effectively. Besides learning from existing products, the project aimed to discover novel ideas, beyond the range of products that are currently available. It is difficult for designers to be successful visionaries without having an adequate understanding of how the future products may be used and what drives users to prefer one product over another. Empathizing with user needs provides vital information for designers—otherwise designing tends to be a "shot in the dark".

Users can offer a valuable design resource to support the designing process. However, such involvement can be perceived as problematic. To some extent users may not be aware of their needs and/or able to articulate them. Coates (1997) distinguishes between the idea of the stereotype (what a typical product is currently like) and the ideal (the imagination of how an object should be like). New designs aim to come reasonably close to the ideal, whilst not leaving the perception of the stereotype (standard) too far behind. Coates (1997) criticizes the use of focus groups in market research based on its preoccupation with stereotypes instead of ideals—because the stereotype is what participants know best about and agree most upon. Ideals are "fuzzy" as they vary across people and are not necessarily conscious. Blue-sky and what-if possibilities are therefore more difficult to reflect upon and verbalise.

Techniques have been employed by the authors to retrieve peoples' ideals rather than their stereotypes to overcome this shortcoming. A methodological "trick" to trigger novel ideas was employed—by encouraging people to consider the "future". By assisting
users in suspending reality, new ideas and wishes may emerge. People begin to think more creatively and disclose their wishes and ideals more freely. The project was problem-led, rather than product-led. It needs acknowledging at this point that individuals require a “warm-up” to such activities. Similar techniques have been employed in industry (Rayner, 1997).

The authors believe that users have a creative potential that can be “unlocked” during Focus Group activities. “When we take the time to truly engage people at the level of their personal experiences, such as home, work, play and learning, we are in domains that are truly meaningful to them. We see high levels of creativity in all our participants in such situations [e.g. focus group activities]” (Sanders & William, in press).

3. Focus groups as a base method incorporating a variety of techniques

3.1. FOCUS GROUPS AS A GENERIC TERM

This section describes and discusses some of the techniques that were incorporated within the focus group framework adopted for this study. Group discussion can be combined relatively easily with a variety of different techniques. This provides varying stimuli to the participants, enables the researchers to gain different types of data (e.g. through questionnaires), and alters energy levels within the session. The way in which focus groups are combined with other tasks may vary depending on the stage of the designing process and the particular objectives. Although the set of techniques developed within this project may go beyond the term focus groups, the authors use it as a generic term and draw on it in favour of other terms such as workshop or participatory group discussion. This is because the term focus groups is relatively well known and concise, thus encouraging participant involvement.

3.2. INCORPORATING A VARIETY OF STIMULI TO AID DISCUSSION

When considering the future, the provision of ideas and visual material encourages, provokes and supports the users in contributing to the discussion. A short presentation about future technologies and trends was included. Videos presenting commercial visionary designs and a light-hearted comedy sketch about futuristic design solutions were shown. They provided a vital starting point for the conversation. Images helped people to imagine the future and encouraged them to develop their own ideas. “Theme sheets” were used to prompt participants’ ideas, and contained the topic and the main questions to be discussed as well as visual stimuli.

3.3. MOOD BOARDS

A technique that was applied in previous projects is the creation of Mood Boards—a collection of visual images (e.g. photographs, material samples) gathered together to represent an emotional response. This technique enables communication of intangible emotions such as happiness, sadness and calm, beyond linguistic restrictions. Abstract images provoke more emotional responses than literal images. Mood Boards may either be used by participants choosing from prepared image selections, or by asking users to
create image collections. It is a powerful tool as designers can make direct use of the results as visual aids. The technique requires considerable resources (e.g. session time to select images or create collages, locating suitable images); hence it was not used during this particular project.

3.4. PRODUCT EVALUATION

It is helpful to evaluate the past and present when considering the future. The assessment of achievements and flaws in existing products—as perceived by users—provides an essential base of information to identify new product requirements. Product handling is a valuable technique for "tuning" users into a topic and focusing their minds on the subject matter. The products serve as stimuli throughout the session either as background material or as the focus of their attention.

It is useful to capture the feedback from these exercises in questionnaires (see Figures 1 and 2). Questionnaires are more formalized than group discussion and can offer an efficient way of data extraction. They can be designed to retrieve a standard set of data that can be used for direct comparison between participants, and to summarize results. However, a small number of participants is unlikely to produce statistically secure data. One drawback is that the responses are limited to the questions that have been prepared. Whilst it is tempting to gain feedback on a wide variety of products it is important not to overload the participants with too many tasks. Producing a large number of questionnaires requires an extensive and time-consuming data analysis.

The "product handling questionnaires" were designed to capture immediate feedback regarding the functionality of the product samples (see Figure 1). User evaluation was based on a retail showroom scenario (e.g. no filling with water), to extract immediate "gut" reactions to the products—thus simulating the often-limited amount of information available when people are actually making purchasing decisions within retail stores.

Figures 1 and 2. Product handling and form filling.
Participants were required to assess the suitability of the product for its intended use. This was based on a simplified task analysis of the product operation. A variety of user feedback was also sought (e.g. on visual appearance, perception of quality and durability).

Two different types of visual questionnaires were developed. A first questionnaire involved visual evaluation of products that aimed at eliciting users’ perceptions when they evaluate products under the restricted conditions of a catalogue. The assumptions made based on appearance alone, when only an image of a product is provided, can be particularly useful for designers. A second visual questionnaire extracted information regarding the aesthetic preferences of people (see Figure 3). It concentrated on evaluating the shape of 20 variations of a product type (e.g. kettles).

3.5. PRODUCT PERSONALITY PROFILING

Product personality profiling is a projective technique that provides an insight into “who” the user perceives to be the target consumer. Participants are asked to imagine a product as a person with a particular personality, and provide information regarding its character and lifestyle (e.g. gender, age and occupation) in a short space of time to encourage rapid “gut” responses. Even though the technique is to some extent limited as the perceptions vary between individuals, it helps to uncover social value systems and emotional responses to products. The technique was applied using questionnaires (see Figure 4 for an example). Whilst some people enjoyed the exercise, others had difficulty with it—particularly with finding suitable examples. Another version of this

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<thead>
<tr>
<th>Please rate these products according to your initial opinion about their visual appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td><img src="image.png" alt="Image of kettles" /></td>
</tr>
</tbody>
</table>

**Figure 3.** Visual questionnaire for retrieving aesthetic preferences.
questionnaire provides a range of typical examples (based on the user responses received to date), so that the user only has to make a choice. This is less time-consuming but more restrictive.

3.6 NOMINAL GROUP TECHNIQUE

Nominal group technique (Delbecq, Van de Ven & Gustafson, 1986) is highly structured. It encourages idea generation and produces immediate results in the shape of a list of rated priorities generated by the participants. It consists of several stages. Firstly, participants individually write down a list of ideas concerning a particular topic. Secondly, a moderator collects all the ideas by asking the members in turn to articulate their contributions briefly (each member giving only one idea at a time), and writes them down for all to see. Thirdly, the group discusses the issues by deciding on a selection of categories that emerge from the list. Fourthly, cards are handed out to rate the categories that are most important to the individual group members. The results can be analysed immediately for key issues to be agreed upon.

The main benefit of the technique is to ensure input from all the members of the group. It is also designed to come to a consensus at the end of the session, based on a specific rating procedure involving all participants. The technique is often used in industry to agree on a set of actions. Whilst the group consensus is not required for this application, it provides a means of creating a tangible output. The technique was beneficial in helping to reflect deeply on a topic, as the process of generating categories gives additional insight.
The technique was applied by requesting a wish list for imaginary appliances or features—assuming that anything goes (e.g. totally non-stick appliance surfaces). It was then possible to narrow down the list to a selection of users' values for kitchen products (e.g. ease of cleaning). Bringing the ideas into suitable categories is a demanding task and there is a danger in putting terms into peoples' mouths to speed up the process. The standard rating procedure was applied. It is rather complex and people could not clearly see the benefits of it.

The authors concluded * that it would be beneficial to apply a hybrid between nominal group technique and brainstorming (e.g. Cross, 1994). The initial idea generation stage may be extended to focus more specifically on a design question, and could be conducted under the conditions of a typical brainstorming session—not being judgmental. The list of initial ideas could be examined through visual grouping (e.g. using cards) in the course of the group discussion. The rating system may be simplified.

3.7. DRAWING THE "ULTIMATE" PRODUCT
During the concept evaluation phase, all participants were asked to draw their ideal product (e.g. coffee maker). The duration for this task was limited to prevent users focusing solely on appearance (only 5 min allowed). In addition, users were asked to name their product. The participants felt unprepared for the drawing task. Although most participants were concerned about the lack of time and the lack of their drawing skills, the outcomes were surprisingly revealing. The consultant designer commented that the users' drawings were a vital source of information. The authors suggest this activity should be extended. Tools to create three-dimensional forms, such as modelling clay, may be included.

Users may find it easier to express themselves three-dimensionally than through drawing (e.g. Lego building blocks). As users do not generally have any previous training in expressing their ideas visually, the exercise needs to be complemented through verbal comments. Moreover, users are likely to benefit from the provision of suitable tools and media for expressing shapes. Sanders (2000) presents an interesting set of tools and methods that could well be incorporated into focus groups—such as a set of objects with simple shapes that are Velcro-covered to “design” new products, and the use of collages using pictures and notes to capture personal situations and feelings. It may be beneficial to assign more time to creative activities of this kind.

4. The design research collaboration

4.1. PLANNING DESIGN RESEARCH
Focus group discussions suit the iterative designing process as they can be applied at various stages. The technique may be utilized prior to initial concept generation. This enables designers to become immersed into user experience to avoid design fixations (preconceived ideas and assumptions, limiting the output of conceptual design (Jansson & Smith, 1991)). At a later stage, focus groups can be assigned equally well to the evaluation of concepts and prototypes. Hence, the effort for training product developers
in using the technique can be justified by the prospect of using focus groups as a consistent complementary method.

The authors recommend an iterative approach that progresses from a stage of broad exploration of the design area at the beginning of the project, to more specific enquiries later. Qualitative data generated by focus groups are not suitable for generalization of potential users, nor for comparison between groups, unless very well pre-defined criteria are being used. Instead of running a series of identical focus groups, the content of the sessions may vary. Each stage may consist of only one or two sessions, allowing one stage directly to inform the next one. The research activities should continuously inform designing activities and vice versa.

4.2. STRUCTURE OF THE PROJECT

The first stage of the project concentrated on exploring techniques to retrieve user needs and aspirations. A variety of data collection tools, analysis tools and materials were developed, applied and refined. The techniques were chosen, combined and improved through close collaboration within the design research team (ergonomist and design researcher). The first stage of the research (focus group sessions 1–6) concentrated on collecting data about user needs and aspirations. Due to practical constraints, the consultant designer was not involved during the first stage of the EPSRC project (see Figure 5).

Design activities did not start until the second stage, when the consultant industrial designer was introduced to the project. This phase concentrated on the generation, development and evaluation of concepts. Research findings from the earlier stage of the project provided the underpinning for the design work. The consultant designer was presented with an overview of the results, through various materials and an initial briefing and brainstorming session with the design research team. The designer took
active part in four focus group sessions—introducing the concepts and making notes of the user feedback. The second stage focused on the evaluation and development of concepts—with a total of four sessions (focus group sessions 7–10).

After the concept design had been completed, the third stage involved a further four sessions (focus group sessions 11–14) concentrating on the evaluation of the appearance models. The consultant designer introduced the features of the design concepts and responded to questions from users.

Although the designer could not become immersed in the complete range of data collected, this has given a practice-based flavour of what the collaboration might have involved under realistic commercial constraints. The designer expressed a clear preference for earlier personal involvement within the research project.

During the stage of analysing user needs and aspirations, the discussion aimed at eliciting wishes and ideas by looking far into the future (e.g. 2050), allowing participants to suspend reality and brainstorm without any restrictions. This information could then be reinterpreted for the design task, aimed for the year 2010 (see Figure 5). Having explored the present and future of the kitchen during earlier sessions, as well as different approaches to heating water, toasting bread and coffee making, it was decided to remain with the three mainstream product types for the designing task—the kettle, toaster and coffee maker. The designer was given unlimited creative freedom.

4.3. ANALYSIS OF USER NEEDS AND ASPIRATIONS—SIX SESSIONS

Three pairs of sessions were held to elicit user perceptions, experiences and wishes. The visual evaluation concentrated on each particular product type. Earlier groups dedicated more time to sharing the procedures, habits and chores in their present kitchen, as well as discussing the kitchen of the future. In later sessions, the time dedicated to discussing future trends was reduced and new topics were introduced, such as the breakfast (current and future) and brainstorming about multi-functional devices. Increasingly, the discussion aimed to be more task-related, commenting on particular product types and their functions.

The more the discussion focuses on particular issues of requirements for design and product functionality (e.g. current flaws of toasters on the market), the easier it is to extract “concrete” design information. However, the immersion into the “day in the life of a user”, to provide insight into culture and lifestyles, can offer a valuable source of indirect information, which is of most value when experienced in the group context.

In the authors' experience, participants enjoy talking about their routines, lifestyles, and preferences. The assessment of products was also perceived as enjoyable. Participants tend to be slightly reserved towards creative tasks (e.g. brainstorming and drawing), although the results were valuable and revealing. When brainstorming (e.g. invent multi-functional devices), the task must not be too wide or too complex. Moreover, participants need time to develop their ideas and suggestions. They need to be encouraged. They should not be expected to take on the role of designers and should be made aware of that. Giving users creative tasks is not an attempt to find solutions, but another way to extract needs and wishes, and pass on users' suggestions to the design team.

The theme of considering the future was a vital tool to tap into peoples' wishes and aspirations. It is useful not to look too far ahead (e.g. 15 instead of 50 years). Also, it was
assumed that the future is “bright”, but a number of people might have other perceptions. Participants should be clear that the question aims at “how would you like it to be” rather than “how will it be”, as it was often found that participants make forecasts rather than consider their dreams. Likewise, they considered their personal situation (e.g. “I will be very old”) instead of thinking in terms of “time travel” to place themselves in a different (ideal) situation. Hence it may be useful to let participants reflect on an “ideal world” rather than the future—or to make sure the conditions are well understood.

It is important that products are seen in the context of their use. Mainstream products such as kettles and toasters are products that are usually used in the domestic kitchen. Their use should not be studied in isolation. Likewise, it is much more useful to think about a device that fulfils the function of heating up water, than trying to improve on a product labelled “kettle”, as this restricts the users’ (and designers’) ability to think creatively.

4.4. INITIAL DATA ANALYSIS TO INFORM THE DESIGNER

The type of research explored within this project aimed to retrieve existing but unavailable knowledge—by aiding communication to support creating new products—as opposed to purely academic research, which usually aims at the establishment of new knowledge. The techniques were developed for practical applications. The extent of the data analysis depends on how well the findings can inform the designing process. Quantification of the results or comparison of data between groups or participants is not advisable unless the groups (a) have been homogeneous (regarding the types of participants as well as structure of the discussion) and (b) involved a substantial number of participants. However, the efforts required for data analysis should not be underestimated due to the wealth of information that is being passed on during a 3 h session.

Whilst there is no need for a precise transcript of the conversations, it may be useful to collect particular phrases and quotations. Video and sound capture is essential, to be able to store passages of speech on hard disk. The availability of a video capture card and a CD writer is recommended, particularly for communicating the results to others.

Making notes of essential issues and comments made by users can be more effective than producing lengthy verbatim notes. Often, after a particular idea has been communicated, some participants display agreement or disagreement. This may be verbally or non-verbally (hence the usefulness of a video recording). It is advisable to make a note of how much agreement there was.

After a number of sessions with similar topics the contents need to be summarized. A range of issues will have reoccurred in different sessions, making a strong point and confirming a point of view or a shared experience. Some concerns will have been raised many times with different examples and details. Other issues might display conflicting opinions. Whilst going through the material, categories or groups of ideas may become apparent. A relatively simple way of substantiating the weight of different classes of notions was applied—by working through the material and giving established categories a “tick” each time a related thought was mentioned. If the contributions differ, then new aspects can be noted down as a new illustration. If no category exists yet, the idea might simply be recorded—similar notions might emerge later. An EXCEL spreadsheet is useful to record, code and sort them by similarity (e.g. Table 1).
TABLE I
Extract of the category analysis (showing categories, related ideas, codes for sorting the list, the total number of each idea mentioned and the total per category)

<table>
<thead>
<tr>
<th>Category/theme</th>
<th>Idea/wish/statement/example</th>
<th>Coffee makers</th>
<th>Attribute</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aesthetics</td>
<td>product needs to fit in (not stand out of average kitchen, be neutral, not too serious, feel homely and friendly)</td>
<td>CM</td>
<td>a</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>brushed aluminium effect good</td>
<td>CM</td>
<td>A</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>nice rounded jug</td>
<td>CM</td>
<td>a</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>yellow is nice colour (nice sunshine)</td>
<td>CM</td>
<td>a</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>this is for people on TV with stainless steel who never cook anything</td>
<td>CM</td>
<td>a</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>chrome is becoming more fashionable now, like metal</td>
<td>CM</td>
<td>a</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>like the simplicity of the design—looks very American 50's; like the way it looks more complicated than it really is</td>
<td>CM</td>
<td>a</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>yellow, short-lived fashion piece</td>
<td>CM</td>
<td>A</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>trouble with yellow on (D) is short-lived</td>
<td>CM</td>
<td>a</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>no sharp edges on things; safe</td>
<td>CM</td>
<td>a</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>speaks for itself—not just for use—makes a statement (I can afford a good one)</td>
<td>CM</td>
<td>a</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>like row of lights/buttons on top</td>
<td>CM</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>the glossiness makes it look cheaper—you anticipate it getting dirty</td>
<td>CM</td>
<td>a</td>
<td>1</td>
</tr>
<tr>
<td>Strong materials, non-stain surface, no flimsy hinges</td>
<td>not to be lightweight, easy to break, no robust materials, flimsy tacky, cheap</td>
<td>CM</td>
<td>d</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>some very weak parts, loose pieces—would get damaged quickly, door on hinges easily broken, feels flimsy</td>
<td>CM</td>
<td>D</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>heavity is measure of quality for people (heavy = expensive)</td>
<td>CM</td>
<td>d</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>The material may be misleading—plastic not necessarily worse; polymer is quite strong; polymer kettles are quite substantial with just a lid to open</td>
<td>CM</td>
<td>d</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>quality to be inherent</td>
<td>CM</td>
<td>D</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>like metal for strength, steel most durable, aluminium gets damaged</td>
<td>CM</td>
<td>d</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>often things are thrown out just because of the state of them</td>
<td>CM</td>
<td>d</td>
<td>1</td>
</tr>
<tr>
<td>Comfortable handling</td>
<td>comfortable, good lifting jug handle</td>
<td>CM</td>
<td>H</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>jug catches; can't get it out smoothly, difficult positioning</td>
<td>CM</td>
<td>H</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>no handle on coffee holder, water tank cover</td>
<td>CM</td>
<td>H</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>easy to work/use</td>
<td>CM</td>
<td>H</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>handle is badly designed (glass gets too hot and too close)</td>
<td>CM</td>
<td>h</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>handle: good grip on it</td>
<td>CM</td>
<td>h</td>
<td>4</td>
</tr>
<tr>
<td>Space-saving but substantial enough</td>
<td></td>
<td>CM</td>
<td>S</td>
<td>20</td>
</tr>
</tbody>
</table>

Note: Codes: CM, coffee maker; a/A, aesthetics; d/D, durability; h/H, handling; S, space.
The product personality profiles were analysed qualitatively by selecting the most frequent response per product and category across all participants. The analysis of the quantitative contents of the questionnaires was relatively straightforward as it could be fed easily into a spreadsheet (e.g. Table 2). Likewise, the users’ comments were arranged in EXCEL for easy comparison. The data were used to complement the focus group results. Additionally, a list with negative and positive adjectives was prepared for each product sample, recording the scope of users’ perceptions (e.g. positive: smooth shape, friendly, nice balance; negative: too fussy, heavy, gimmicky). This was perceived as particularly useful by the consultant designer.

The designer was given an overview of the results including data in the shape of Tables 1 and 2 as well as a list of ideas and comments. The information included some early ideas for shapes and mechanisms, as the data lent themselves easily to the stimulation of design ideas. The designer was given a CD with selected video samples from the focus groups, organized under particular topics. An initial discussion and brainstorming session of the design team (design researcher, ergonomist and consultant designer) highlighted some of the findings, provided further insight into the results, clarified questions and specified product requirements.

<table>
<thead>
<tr>
<th>Categories from the questionnaire</th>
<th>Rating based on chosen priorities</th>
<th>Rating based on relative importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual appearance</td>
<td>28.2</td>
<td>2.21</td>
</tr>
<tr>
<td>Product being value for money</td>
<td>27.1</td>
<td>2.25</td>
</tr>
<tr>
<td>Functionality</td>
<td>26.5</td>
<td>2.54</td>
</tr>
<tr>
<td>Appearance of robustness</td>
<td>16.4</td>
<td>2.35</td>
</tr>
<tr>
<td>Ease of use</td>
<td>15.6</td>
<td>2.40</td>
</tr>
<tr>
<td>Physical appearance</td>
<td>12.5</td>
<td>2.19</td>
</tr>
<tr>
<td>Cost being below a maximum level</td>
<td>8.5</td>
<td>1.86</td>
</tr>
<tr>
<td>Environmentally friendly</td>
<td>6.6</td>
<td>1.92</td>
</tr>
<tr>
<td>Product is self-explaining</td>
<td>4.4</td>
<td>2.11</td>
</tr>
<tr>
<td>Brand</td>
<td>4.4</td>
<td>1.44</td>
</tr>
<tr>
<td>Ease of cleaning</td>
<td>2.9</td>
<td>2.23</td>
</tr>
<tr>
<td>Product takes up little space</td>
<td>2.6</td>
<td>1.86</td>
</tr>
</tbody>
</table>
Comments from the designer revealed that presenting a mass of data to the designer as an introduction to the project might have been counterproductive. The designer particularly valued information in the form of bullet lists, including ratings of importance and examples of comments.

4.5. CONCEPT GENERATION AND EVALUATION—FOUR SESSIONS

Having studied the results of the first stage of the research, the consultant designer produced concept drawings, making use of the insights gathered during the data collection phase. The feedback from the first two sessions was used to develop a second set of concept drawings for evaluation. Product handling was included within the sessions, but mainly as stimuli, reference points and visual aids. The concepts were evaluated through discussion. After giving participants time to study the concepts visually, the designer introduced the five selected concepts in a product group (kettle, toaster and coffee maker). An evaluative discussion and suggestions for improvement followed this. After each product group the participants chose their favourite concept. After the discussion, participants were asked to draw their “ideal” product.

The first design concepts aimed to explore novel features and functions based on users’ wishes, rather than addressing visual appearance alone. During the early stages of the concept evaluation a description of a mechanism is enough to stimulate new ideas, full visualizations are not always required.

Not all users were comfortable with evaluating drawings. The use of foam models to gain an impression about the proportions and size of products would be beneficial. Positive feedback was gained from users by continually providing idea stimulation material (e.g. facts, visions and visuals) as “food for thought” throughout the sessions.

The dual moderator role between the design researcher and the designer has proved to be beneficial—as it distributes activities and helps to keep the session going when it seems to run out of ideas and to make sure nothing is forgotten. The designer regarded his presence during the sessions as vital—because of the direct involvement in the process, being able to lead the discussion regarding the concept evaluation, and the opportunity to ask questions relevant to designing.

* The designer benefited from skills in leading a group discussion—to be able to deal confidently with difficult situations (e.g. promoting discussion and handling dominant characters in the group), and ask relevant questions to promote deeper insight and discussion.
* The designer would have preferred more access to observing the use of products in different situations, either directly or on video.
* The designer appreciated not being made responsible for setting up and organizing the sessions beforehand (e.g. recruit participants, schedule sessions, prepare questionnaires), allowing the opportunity to focus solely on preparing the questions and concentrating on progressing the designs.

4.6. CONCEPT DEVELOPMENT, SELECTION AND REFINEMENT

The subsequent data analysis during the concept evaluation phase was conducted by the ergonomist and fed to the designer. The experience of taking part actively in the
discussion was a vital source of information for the designer. At this stage the designer
preferred a brief presentation in the form of a specification list rather than video samples
or transcript summaries. It became clear that the process is time-consuming.

The designer regarded the regular consultations with the design research team as
vital—to set out issues for the next focus group sessions, discuss the design concepts,
review the meeting of user requirements, and to decide on the selection of concepts to be
taken further. Both these sessions and the user discussions were productive in continually
examining the designing tasks to generate solutions, by involving different points of view.

4.7. EVALUATION OF THE APPEARANCE MODELS—FOUR SESSIONS
Based on the user feedback, preferred concepts were selected and developed. The
consultant designer maintained constant contact with the design team. He produced
renderings and appearance models of the final designs, which were presented to users
again. Two of these sessions were conducted with “hot” users (participants who had
taken part in the study earlier). For the other two sessions “cold” users were invited
/people with no previous knowledge of the project). The “hot” users were more critical
regarding the details—but all delivered a “wealth” of constructive comments. Ideally, the
user feedback should have been the basis for further refinement of the designs, but this
was not possible within the scope of this project.

5. Discussion and outlook
It has often been proved difficult to incorporate human factors methods and findings
into the working practice of designers. This may be due to conventional designing
methods being relatively informal compared to human factors methods. Focus group
activity offers an informal and flexible technique that might suit the working practice of
designers well. Focus groups aid communication—both between designers and users,
and as a vehicle to facilitate multidisciplinary collaboration amongst experts leading to
a growth in mutual understanding and cross-fertilization of ideas. There are clear
benefits to be gained by involving designers as early as possible in the research process.

The experience from this design project has provided the basis for training material to
equip designers with the skills to incorporate user studies into their designing process.
This is both aimed at undergraduate training but also at widening the skills of practising
industrial designers and product developers. A guide has been compiled by the authors.

The authors recognize that this study has a number of limitations. Firstly, only one
design consultant took part in this initial study. Due to the diverse nature of designing,
studying the progress of one individual designer will not lead to understanding gen-
eralized behaviour of other designers. Secondly, the designer was not available in the early
stages of the designing project. Thirdly, the designer had previous experience of focus
group techniques, which does not reflect the profile of the majority of practising
designers. Nevertheless, it is suggested that this study has gone one step towards bridging
the gap between Ergonomics and Industrial Design. By beginning to tailor the tech-
niques to the needs of designers, they will be better enabled to utilize these methods.

Similarly, the authors fully recognize that the Focus Group method is not the only
relevant procedure. There are other methods which may be developed further and used
collaboratively by ergonomists and industrial designers to elicit other aspects of the context of use and the wants, needs and desires of users—for example, one-to-one interviews, observation in users' homes or work places, task analysis, cognitive walkthroughs and user trials/usability tests.

To validate the suitability of the approach, further studies need to be conducted. This can only be done through applying, evaluating and refining them during a variety of design projects. Designers from diverse backgrounds (e.g. education, culture, gender) may apply the techniques for various projects with a range of different time scales, or a variety of product types.

The authors acknowledge that the uptake of user research methods by designers requires a paradigm shift. The consultant designer had been trained with a series of user-centred design methods and was therefore relatively receptive and supportive of the approach. The availability of techniques and training material for designers may encourage the increased adoption of design research methods.

6. Conclusions

The project has raised significant interest within British manufacturers, as they recognise the value in designers' involvement in user research by employing a variety of methods. The authors envisage the use of the materials for student design training, to contribute to the development of a new generation of designers. It has become clear that developing techniques specifically for industrial designers in close collaboration with human factors experts will support the changing culture of design research.

The authors would like to acknowledge the consultant industrial designer on this project, Jonathan Bainbridge, for his collaboration and constructive comments. As well as having experience in designing and developing consumer products, he has also been trained in employing user-centred design approaches (e.g. focus groups). He recently graduated from Loughborough University in Industrial Design and Technology (first class honours).

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Visual product evaluation: exploring users' emotional relationships with products.
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Visual product evaluation: exploring users’ emotional relationships with products

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Abstract

This paper discusses an industrial designer’s approach to eliciting user perceptions and emotional responses to products through visual evaluation and stimuli. Whilst the authors accept that product functionality is crucial for product success, the appearance, use of materials, shape and form provide the most immediate product data for the user. Less tangible issues such as emotional bonding of users with products, cultural perceptions and social value systems, provide valuable insights for the product developer to help expand knowledge and understanding of the users’ need beyond the functional.

This paper presents product personality profiling as a new technique for design researchers/designers, and discusses it alongside other emerging approaches such as mood boards and visual product evaluation. The authors have used these techniques during focus group sessions with users to elicit individuals’ needs and aspirations towards products. Such a user-centred approach is fundamental to applied ergonomics. Experiences, benefits, and limitations of these techniques are outlined as well as the opportunities for further development. © 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Industrial design; Emotions; Product personality profiling; Product evaluation; Applied ergonomics

1. Introduction

Products satisfy a number of needs. Individuals interact with a vast number of diverse products throughout their daily life. Functional appropriateness is key to a product’s success in the market place, as well as its fitness for purpose. Another form of functionality may be referred to as soft functionality (McDonagh-Philp and Lebon, 2000). It includes emotional needs and other intangible, qualitative aspects that affect the relationship of the user with the product. There are difficult trade-offs to be made between functionality, basic ergonomics factors and emotional factors, thus highlighting the need for collaboration between ergonomists and designers. Functionality, ergonomics and emotional components are equally important in product development. The authors advocate that the techniques detailed in this paper will enable designers to tap into users’ emotional interaction with products, leading to more informed decision-making in the designing process.

There is considerable interest and growing recognition for the emotional domain in product development. The relationship between the user and the product is paramount in industry and currently there is major investment in design research in this area. The 3rd Design and Emotion Conference 2002 to be held at Loughborough University, in collaboration with Delft University of Technology and the Design and Emotion Society, will be held in July 2002. This timely conference is sponsored by industry and research councils, highlighting the value placed upon this expanding area of research.

The emotional relationship between the user and product is determined, to a large extent, by the symbolic dimension of the product. The symbolic meaning of an object often relies on shared understanding between individuals. Solomon (1983) argues that consumers use product symbolism to define both themselves and their relationships with others. The term symbolic consumption has been coined to describe the quasi-language through which people use products to communicate with each other (McCracken, 1988).
Dittmar (1992) suggested that this communicative aspect of material objects needs to be investigated in order to understand why it is important for people to convey the right messages about themselves through their possessions and that such investigation may elucidate how we decipher other people based on their material circumstances. Dittmar (1992) states that possessions symbolise not only the personal qualities of individuals, but also the groups they belong to and their social standing. Fig. 1 represents this idea schematically.

Material possessions serve as symbolic expressions of who we are. The clothes we wear, the household items we buy, all enable us to express our personality, social standing and wealth. Fig. 1b shows the range of uses material possessions may have.

Even practical products, such as kitchen appliances, will have some symbolic significance. In choosing such products, consumers are likely to be influenced by the messages they believe these objects convey and the extent to which their overall impression of the product matches the image they have of themselves.

Manufacturers are becoming increasingly aware of the requirement to satisfy user needs beyond the functional. This is highlighted by the vast choice of similar products available in the retail showrooms. The customer/consumer is becoming more discerning. Manufacturers are keener than ever to distinguish their products in the market place and are therefore exploring new and innovative approaches to eliciting user data relating to the symbolic dimensions of products.

![Diagram of Material Possessions and Symbolic Expressions](image)

Fig. 1. (a) Material possessions as symbols of identity (Dittmar, 1992), and (b) meanings of material possessions for identity (adapted from Dittmar, 1992).

Understanding intangible user needs may be problematic as users often find difficulty in expressing them and are not necessarily consciously aware of them. Identifying intangible aspirations towards products usually requires the collection of qualitative data. This includes understanding of aspects such as emotional bonds with products, cultural contexts, and associations, implications of lifestyles, social value systems and stereotyping, the underlying meanings of products, fashion preferences, and attitudes towards product aesthetics. This paper illustrates three techniques that have been used within focus group activities to support a number of design projects (McDonagh-Philp, 1999; Bruseberg and McDonagh-Philp, 2001). Product personality profiling taps into the users' perceptions of who they feel particular products are aimed at. Mood boards express emotions regarding products, tasks, or situations through image collages. Visual product evaluation elicits initial reactions to products, based on product appearance only, to simulate retail showroom scenarios, mail order, and/or Internet purchasing.

The authors advocate that the analysis of user needs and aspirations should be an integral part of design activity (especially pre-concept generation stage) to ensure the employment of user-centred designing principles. Designers need to be directly involved in the data collection processes, particularly when qualitative data are involved, thus feeding relevant information promptly into the designing process. Accordingly, the data retrieved from user studies should support the creative process of designers. The direct immersion into the user data and the exposure to users' perceptions supports designers in exploring design problems, channels their efforts, and helps to reduce, or at best, avoid design fixations (pre-conceived ideas and assumptions, limiting the output of conceptual design (Jansson and Smith, 1991)).

Emotional values may differ for different product types. For some product categories, they are more important than for others (for example comparing jewellery with garden tools). The need to identify 'customer delighters' beyond functional values has been identified through research in the area of car design (Burns and Evans, 2000). The studies reported here have concentrated on consumer products and playground equipment, which are characterised by both functional and soft-functional values. For this product area, a wide consumer choice leads to fierce competition in the market and rapid changes in appearance and features of products, but not necessarily satisfying the user.

This paper examines experiences of using visual product evaluation techniques for eliciting user needs and aspirations beyond the basic utilitarian functional by discussing the employment of product personality profiling, mood boards, and visual product evaluation. All of these techniques have been used as activities...
integrated within focus group sessions, and provided additional stimuli for the group discussion. The authors outline the potential of the techniques by illustrating how they have been introduced and developed, and how they may be refined further.

There are three distinct stages of product development that would benefit from employing these techniques. They are at (i) the initial stage for capturing users' perceptions on existing products (pre-concept design); (ii) the requirements capture stage to elicit users' ideas regarding their ideal products (early concept-design stages); and (iii) the intermediate design stages to evaluate design concepts.

2. Empathic design

In recent years, there has been a shift in conventional design training towards a more user-centred design approach. This shift has been in direct response to the increased awareness and recognition of the users of products as a potentially rich design resource to support product development. Bird (1999) forecasts that the ever-increasing consumer culture will require designers to "get under the skin of social, lifestyle and user needs" (p. 36).

Creative activities are, to a large extent, based on a deep immersion into the designing problem (Baxter, 1995; Cross, 1994). Pereira (1999) suggests that "originality may reside in the way we find problems and not in the way we generate solutions" (p. 228), and emphasises that "The creative act must be an immersion into the situation of use, a truly felt empathy, not because we voluntarily acknowledge the user but because we need that connection in order to create." (p. 227) Incorporating user research into designing activities has the potential of substantially enhancing designers' creativity as well as facilitating effective ergonomic design.

Creativity has been defined as shared imagination (Dewulf and Baillie, 1999). Accepting that designers do not have a monopoly on creativity, it becomes increasingly important to provide the opportunities and environments that encourage users to express themselves in order to uncover, reveal and trigger effective problem solving solutions. It would be naïve and inappropriate to assume (or expect) that users will provide a design/product solution. However, through creative and supportive contact and research methods such as those mentioned within this discussion, design research can begin to bridge the understanding of the designer with the real life experiences, needs and aspirations of users (Sanders and William, 2002).

In Britain, design training tends to be conducted through undergraduate and postgraduate university design degree programmes. Therefore, the profile of the average design graduate does not necessarily represent the profile of the wider population, the mainstream user (Norman, 1990). Due to training, background, education, gender and age, it is unrealistic to expect (or accept) that designers are able to rely upon their own experience, knowledge and understanding alone, when designing for others.

The concept of the empathic horizon (McDonagh-Philp and Denton, 2000) has been developed, which highlights the need for designers to immerse themselves within the user experience to reduce (if not avoid) design decision-taking place which is based on uninformed assumptions. The authors are not advocating that designers become market researchers but that they integrate design research into their pre-designing process(es).

The conventional industrial/product designers' toolkit is evolving and expanding to incorporate (design) research methods and techniques. Design research skills are emerging as a key element in the training of designers. This does not detract or devalue the work of market researchers (e.g. professional focus group moderators, market research surveys and questionnaires). Involving designers in the data collection processes to elicit design-related information from the raw data ensures that design opportunities are not missed or overlooked.

3. Product personality profiling

Product personality profiling (PPP) is a projective technique that has been adapted from market research. The use of projective techniques has a long-standing tradition in psychology. Projective tests derive from the psychoanalytical approach to assessing personality characteristics. Projective tests are used by psychoanalysts who favour the richness of the information they offer. Proponents of these techniques believe that the qualitative data generated can offer valuable insights into clients' personalities.

Variations of the product personality profiling technique are currently employed by manufacturers (e.g. Kenwood and Morphy Richards) to identify users' perceptions of typical purchasers of products, but these are less formalised, and data capture is not as structured as that presented within this paper. The technique provides an insight into who the user perceives to be the target consumer. Participants are asked to imagine a product as a person with a particular personality, and provide information regarding its character and lifestyle (e.g. gender, age and occupation). The technique helps to reveal social value systems and emotional responses to products.

The technique has been employed by asking participants to fill in questionnaires during a focus group session. Participants are required to carry out the task in
a short space of time (2–3 min/product), to provide immediate gut responses. Fig. 1 shows an example with user responses. It is useful to compare the responses during a subsequent group discussion to further understand the motivations behind people's choices. Users tend to appreciate the opportunity to discuss their responses within the group. Failure by the moderator to enable this shared experience may lead to the group feeling unsettled. By discussing their actual perceptions of each product with each other, previously unexpressed views and feelings may be revealed. This sort of activity may also be used to warm-up users for focus group discussions.

Table 1 illustrates feedback obtained from a user whilst visually evaluating two products (coffee makers) by employing the PPP technique. Alongside the users' own profile (column A) the product profiles (columns B1 and B2) can be reviewed. In this case, it would be considered highly unlikely for the user to actually purchase product B1 based on their own personal profile, they are more likely to purchase product B2.

The technique may be employed during most stages of product development. The most apparent application is the evaluation of concepts regarding their suitability for a particular target group. Moreover, the technique can be useful during the stage of researching user needs prior to concept design. Existing products can be evaluated to understand product associations with social value systems. Given that consumers make social inferences about products, techniques such as PPP can be used to tap into this important source of information and use the results to inform the designing process. Designers can draw on typical responses to particular products after averaging the responses from a range of users. The technique may also be used to retrieve participants' imagination of their ideal product—by asking them to describe it as a person who is going to live in their home.

The authors have employed two versions of a PPP questionnaire. Initially, users were presented with a sheet in a tabular format, where users were asked to provide responses in several columns, where each represented a particular product (identified by a picture), to a range of criteria shown in rows on the left (similar to Table 1). This had two drawbacks. Firstly, instructions had to be re-emphasised to prevent the user filling in the form by row (and therefore not focusing on each product personality sufficiently). Secondly, some users suffered from lack of imagination for suitable examples (e.g. car models), even though they were able to project a type of person onto the product.

This led to the development of a new form, as shown in Fig. 2. It shows only one product per page and provides a range of examples. The examples deliberately cover a wide range of aspects and were collected using users' responses, thus reflecting the users' terminology. Participants found it much easier to fill in this form. The drawback is that users may simply choose one of the examples and not really consider the task. The form shown in Fig. 2 can be further improved by moving the response column to the middle, thus taking the focus of the examples provided. When choosing which form to use it has to be considered whether general categories are the primary target, or the terminology and power of imagination of the users.

Another important factor is the extent to which perceptions vary between individuals. The interpretation of the responses is not an exact science as it relies upon subjective data and interpretation of feedback—all of which are qualitative and culturally based. For example, gaining awareness and understanding of how users

Table 1

<table>
<thead>
<tr>
<th>Gender</th>
<th>B1</th>
<th>B2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>25</td>
<td>45</td>
<td>30</td>
</tr>
<tr>
<td>Secretary</td>
<td>Graphic designer</td>
<td>Administrator</td>
</tr>
<tr>
<td>Semi-detached</td>
<td>Penthouse flat</td>
<td>3 bed terrace</td>
</tr>
<tr>
<td>Vauxhall Corsa</td>
<td>BMW 5 series</td>
<td>Nissan Micra</td>
</tr>
<tr>
<td>Steady</td>
<td>Dynamic/Introvert</td>
<td>Organised</td>
</tr>
<tr>
<td>Spain/France</td>
<td>Bahamas</td>
<td>Euro-camping</td>
</tr>
<tr>
<td>Traditional</td>
<td>Modern/minimalist</td>
<td>Clean/tidy</td>
</tr>
<tr>
<td>Marks &amp; Spencer</td>
<td>Armani</td>
<td>Next/Gap</td>
</tr>
</tbody>
</table>

Likelihood of participant purchasing product—emotional bond present

<table>
<thead>
<tr>
<th>A</th>
<th>B1</th>
<th>B2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>YES</td>
<td></td>
</tr>
</tbody>
</table>
interpret and respond to visual data is of paramount importance. Through the use of materials, colour, texture, product semantics and semiotics, users are attracted or distracted, intrigued or repulsed, wish it, engage or resist interaction with products, leading to final purchase, or products remaining unsold on the shelf. The communication between the product and the user is a complex area. For the designer, immediate gut responses from users provide valuable insight on which to base their own design decision-making. By capturing this type of data, the design team can gain an overall impression of the perceived target user from the sample group of actual users.

Benefits
- The technique provides a suitable tool to elicit emotional perceptions and insight into social value systems.
- The technique provides an abstract way of revealing user perceptions and hidden information which can be used to understand aspects that many people are unaware of or which they find difficult to express.
- The results can be directly mapped to actual user profiles.
- It generates lists of user terms and points of reference.

Limitations
- The technique might be over-using stereotypes—some people were reluctant in filling in the forms because they feared that attributes such as age may lead to making stereotypical assumptions about people's aspirations.
- There is no guarantee that this technique captures peoples' purchasing intentions based on their background, but may capture what products people aspire to—their actual personal situation may be influenced by other factors whilst they may wish to be somebody else or in a different situation.
- Interpretation of the results may be complex; there may be some limitation of how designers can make direct use of the data as the results have to be interpreted very carefully and the researcher has to read between the lines.

4. Mood boards

4.1. Mood boards and designers

Mood boards are a collection of visual images (e.g. photographs, material samples) gathered together to
represent an emotional response to a design brief (Garner and McDonagh-Phillp, 2001). This technique enables designers to communicate and express themselves beyond linguistic restrictions. Designers may use this tool to communicate intangible and abstract emotions such as happiness, sadness, and calm. Equally, this tool has been employed to enable users to communicate their emotional responses to products, tasks, and their experiences through abstract images. This can also be an internal process for designers to support them in clarifying and interpreting their own understanding of the design brief and the wider implications of the design project.

There are no prescribed formulae for mood board creation. Abstract images provoke more emotional responses than literal images, as this may be too specific and restrict the idea generation process of designers. Fig. 3 illustrates an example of a mood board. It represents the effective use of mood boards as a technique, by drawing on abstract rather than literal images, to communicate an emotional response.

Beyond the use by designers, mood boards can be used effectively to support users in communicating a range of emotions and attitudes to designers. Images can convey powerful meanings. Hence, they are an ideal method to unlock feelings that users may otherwise find difficult to express. The technique can be used within focus group sessions. Users may either be asked to create their own mood boards from their own images, or may choose from a set of pre-selected images.

4.2. The creation of mood boards by users

Mood boards are a powerful tool to communicate users' emotions, experiences, aspirations, and perceptions to designers. Sanders (2000) uses similar techniques (image collages) as part of a broad toolkit to identify the aspirations of everyday people rather than customers or consumers—long before concrete product ideas have been developed.

Suitable images can be found in magazines and online sources. Pre-selecting a wide range of sample images reduces the time needed for assemblage, and provides suitably abstract images. Because the range of images provided pre-determines the selection to some extent through availability, it is vital that a broad range of images is being provided. It is useful to involve all members of the design and research team in the image allocation and selection to cover a wide range of ideas. It is also beneficial to create test mood boards by the design research team members, if possible, to pre-judge the suitability of the images and gain initial insights into the topic and the formulation of the task.

A recent study was conducted by the authors that focused on the essence of play with regard to the design of playground equipment. The user sample included children between 7-9 years of age (n = 5), and parents of 5-9 year-olds (n = 11). During a 3-hour participative workshop with the children, mood boards were generated. The technique is very well suited to working with children, as they are particularly imaginative when

Fig. 3. Example of a mood board generated by a designer.
working with images and their verbal communication is less refined than adults. Six of the parents took part in a 3-h focus group discussion with a range of activities integrated within it, including mood board creation. The other five parents filled in feedback booklets independently, but in a group setting, whilst their children took part in the workshop.

The parents and children were provided with a sample of diverse images that had been gathered beforehand by the design team. About 80–100 images were available in several identical sets. Ideally, a large number and wide variety of images should be available to avoid pre-determining the outcomes. Participants were asked to select images that represent play to them, and assemble them on a sheet of paper. The participants completed this task individually. Fig. 4 shows how the children created their mood boards. Each participant also provided a brief explanation of his or her mood board, and reasons for choosing each image, both through brief notes next to the images, and through verbal comments in a group setting (see Fig. 5). This is important because only then can the choice of images be usefully interpreted by the design team. A high degree of symbolism was displayed, and particular ‘triggers’ from their personal experiences and memories were expressed. For example, play was expressed by many participants as a social activity. This visually based exercise encouraged all the participants to express themselves freely beyond linguistic restrictions.

4.3. Selection of mood boards by users

One of the drawbacks of applying this technique is that it can be the time consuming when locating suitable images, and allocating the time for participants to cut out images and arrange them. A simpler version of mood board use is asking participants to make choices from a restricted selection of images for certain aspects.

This supports a more formalised analysis, but restricts the choices. Here, it is particularly vital to record reasons for choices. Table 2 shows a range of questions and the six images that were presented to participants to choose from for each association. The participants were given examples of mood boards (compiled by the design team in advance) reflecting ironing as a task, an actual iron, the ironing environment, and ironing of the future. The selections were made by ticking the appropriate image and adding a few comments. The activity was used as a warm-up for the focus group discussion. Designers could then work directly with the image collection and feedback during the concept generation stage of the project. Mood boards produce a direct visual output and can be used throughout designing process. The example shown, was part of an undergraduate design project (funded by the Nuffield Undergraduate Bursary Scheme), where the qualitative information from non-verbal user feedback was evaluated as particularly valuable for the designer.

4.4. Summary

Though this technique will not provide design solutions, it offers the opportunity and a mechanism by which both designers and users can express themselves visually and respond to visual stimuli. This technique develops one element of a designer’s toolkit and brings it into the domain of participative design activities.

Benefits

- They are inexpensive to generate.
- They enable users to communicate beyond linguistic restrictions.
- They provide visual stimuli and inspirational material to support and encourage discussion between designers and users.
• Designers can use the results directly to stimulate thoughts and emotions.
• When incorporated within a range of diverse activities (e.g. focus groups), it can offer researchers a valuable tool to promote and stimulate user interaction.

Limitations

• One of the main drawbacks of mood boards is that they are often misunderstood and images used can be too literal.
• It requires the preparation/availability of suitable images.
• It relies upon abstract forms being presented and it requires designers to be skilled in identifying non-verbal communication.
• Users may resist the technique due to unfamiliarity.
• They rely upon subjective interpretation.

5. Visual product evaluation

With the advent of Internet shopping, mail order catalogues, and television shopping channels, one key element that contributes to a product's success is its visual impact. Visual evaluation of products takes place initially within an extremely short space of time, and it is often based on limited product data. The data that are relied upon include the product’s shape, form, the use of materials, colour, product semantics and semiotics, etc. Customers often may make purchasing decisions based on whether a product looks durable and functional, beyond the consideration of the aesthetic attributes. This highlights the importance of visual data, from both the users’ and the product developer’s perspective.

Capturing users’ immediate visual evaluation of products (existing or conceptual) enables the design team to gain further insight into values that are being assigned and attributes that are recognised as valuable. A technique being developed called Visual Product Evaluation simulates mail order or Internet purchasing scenarios by restricting the data available to the user. Within a relatively short space of time (5min per product), users are requested to evaluate a product based solely on the appearance from a two-dimensional image (e.g. slide projection, photograph or rendering). In contrast to focus group discussion, the users are required to complete this visual evaluation in a self-contained way (e.g. no conversing with other users). Once the visual evaluation has taken place, it may be appropriate to allow the users to handle the products to simulate a retail showroom scenario (see Bruseberg and McDonagh-Philp, 2001 for further details regarding related techniques).

Data capture in a form as illustrated in Fig.6 provides a mechanism for comparing a range of users’ responses (e.g. what do you think of its colour?), whilst also capturing their views and opinions through the more closed questions (would you buy this product?). Rating scales ranging from 1 (very poor) to 5 (very good) were used to quantify the feedback (Likert, 1932). However, the most useful information stems from the combination of the ratings with the comments made regarding the reasons for the selection (Dumas, 1998). It is valuable to ask users for a brief comment regarding their selections. Likewise, it is useful to retrieve information regarding any previous knowledge or experience they may have of the product, and feedback concerning the likelihood of the user purchasing the product.

Two types of visual evaluation forms have been developed. The first one (refer to Fig. 6) retrieves initial
1. Regarding the visual appeal of this product, what do you think of its shape and styling? (e.g. form, proportion, character)

<table>
<thead>
<tr>
<th>Level</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>0</th>
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<tr>
<td>a)</td>
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2. What do you like about the appearance of the product?

3. What do you dislike about the appearance of the product?

4. We need to find out whether you have got any previous knowledge of this model. Please tick in case you currently own it, use it, used it in the past, have seen it before, have not seen it before.

5. Would this product suit your kitchen?

6. Would you want to buy this product?

7. Please estimate the retail cost of this product.

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Fig. 6. Visual product evaluation questionnaire.

Reactions to selected products based solely on visual data in detail. The second form (refer to Bruseberg and McDonagh-Philp, 2001) concentrates primarily on the elicitation of aesthetic preferences based on a brief evaluation of the overall shape of 20 variations of a product type (e.g. kettle or toaster) and retrieves the main reasons for preferences. It can be used to identify stylistic preferences at an early design stage, particularly when used as a basis for a follow-up group discussion. Early results from this questionnaire show striking differences amongst the user population, thus emphasising the need to retrieve qualitative data to understand user motivations.

Benefits

- The technique provides rich design resource material to evaluate the visual quality of product concepts, or to learn from the benefits and drawbacks of existing products.
- The analysis of the questionnaires is straightforward due to the standard data retrieval, the use of rating scales and short comments.
- The technique provides a valuable change in activity during longer user workshops (e.g. 3-hour focus group session).
- The technique can be used to promote focus group discussion.
- Findings can be related to product handling evaluation.

Limitations

- Forms and questionnaires can restrict user responses.
- Poor picture quality may mislead users.
- Forms may be time consuming to prepare in advance.
- Activity of data retrieval and analysis may be perceived as taking the designer away from actual designing.
- Users may be unfamiliar with exercise and experience difficulty.

6. Summary

Emotional bonds between users and products are an essential element that can determine the commercial success of a product; products satisfy a range of needs beyond the functional. The designer is neither a trained psychologist nor professional market researcher. They bring to product development a range of creative problem solving skills that can then be represented two- and three dimensionally.

Whilst the qualitative techniques presented in this paper (product personality profiling, mood boards and visual product evaluation) are still being developed by the authors for use by designers and product developers, they have already contributed to a range of diverse design projects. The authors believe that these techniques will have wide application across a broad range of design sectors, such as domestic appliances, clothing,
health care products, vehicles and technology-led products.

The techniques are generally highly flexible and well received by the users. They support the design team in providing user data (evidence) on which to base design decision-making during product development. They are all particularly useful in the pre-concept and concept generation stages of the designing process. They are expanding the design teams' understanding and empathy with the user need, desires, and aspirations.

They are only tools and may not be appropriate for each and every project. However, they will contribute to the expanding toolkit of designers to support user-centred design research. It makes sound economic sense to invest in user research prior to concept generation, as any change to the product after this point based on research findings and user feedback, will prove expensive to implement.

Acknowledgements

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People are Doing it for Themselves

ABSTRACT
To date, the objective of creating pleasurable products has concentrated on designers articulating and interpreting user needs as part of the product creation process. This paper explores approaches to enable users to adapt, modify, specify or create products to match their needs directly. Using the potential of new technologies, active consumers can now become product creators, paralleling developments in graphics, music and digital media production. Empowered users, self-builders, recreational manufacturers, web-connected silver surfers (retired individuals using the web) and punk manufacturers [1] all exemplify this new relationship between users and products, and the evolving role of designers [2].

Categories & Subject Descriptors: Add Here
General Terms: Add Here
Keywords: Supra-functional needs, customisation, user participation, democratisation of design.

INTRODUCTION
People gain pleasure from products that meet their functional and supra-functional needs. Supra-functional needs include emotional, aspirational, cultural and social [3, 4]. Indeed, now that adequate product functionality is the norm, supra-functional factors are recognised as more important. Emotional bonding, symbolic representations, tribal connections, subculture references and so on, all form part of the language of defining product personality and product semantics.

Whilst all aspects of the relationship between users and products are of interest to designers, this paper concentrates on those that involve direct input from users themselves, before or after the product has been purchased.

How users interact with products
Long-term use is one aspect that changes the relationship between users and products and often the nature of the product itself. Designers are pre-occupied with the benefits of innovation and novelty, but some have reflected on the attachment felt by users towards familiar and well-loved products. Richard Seymour (Seymour Powell Associates) in a recent seminar for the UK Ceramics industry [5] spoke about the characteristics of objects and materials that exemplify positive long-term product relationships. Zippo lighters, Timberland boots, bulging Filo faxes and aged Levi 501s were all cited as examples. Seymour was talking about product characteristics as emotional ergonomics, where success involves integrating the aesthetic, ergonomic, tactile and functional aspects of products.

Another writer, Stewart Brand has stated:
‘The widespread fakery makes us respect honest aging all the more. The one garment in the world with the greatest and longest popularity — over a century now — is Levi’s denim blue jeans. Along with their practical durability, they show age honestly and elegantly, as successive washings fade and shrink them to perfect fit and rich texture. Ingenious techniques to simulate ageing of denim come and go, but the basic indigo 501s, copper-riveted, carry on for decades. This is highly evolved design. Are there blue-jeans buildings among us? How does design honestly honor time?’ [6]

Brian Eno, musician and artist, in communication with Stewart Brand wrote:
‘We are convinced by things that show internal complexity, that show the traces of an interesting evolution. Those signs tell us we might be rewarded if we accord it our trust. An important aspect of design is the degree to which the object involves you in its own imagination. Some work invites you into itself by not offering a finished, glossy, one-reading-only surface. This is what makes old buildings interesting to me. I think that humans have a taste for things that not only show that they have been through a process of evolution, but which also show they are still part of one. They are not dead yet.’ [6]

Another aspect that deepens the user-product relationship is brand loyalty and identification, particularly with cult products. The diverse mixtures of individuals who make up the Harley Davidson motorcycle owners club in the USA have a shared relationship with a unique and idiosyncratic product range. The simultaneous identification with traditional American manufacturing values and the perceived outlaw status of bikers is a extremely potent mixture that people pay large amounts of money to participate in.
Whisper it please, but the average age of a Harley rider has accelerated from 38 to 46 in the last decade. The best kept secret of the Harley brand is that its customers are more likely to be accountants and lawyers than unkempt hippies or ferocious Hells Angels. [7]

Some product types engender some loyalty and cult status but a Tefal cordless kettle owners club would be hard to envisage. Whereas, the Braun museum in Darmstadt, Germany, organises an annual barbeque, which is well attended by those who want to buy and sell Braun products.

A different relationship occurs for users with objects created by their own labours, where decisions are less constrained by consensus, market and trend predictions. We can all empathise with the guitarist Bryan May, serenading HM Queen at the Party at the Palace (May 2002) using the guitar he made when a school boy from scrap timber.

Most of us will have experienced the pleasures of having something made specifically for us, whether it be by a doting parent, a local tailor, Dell computers or our friendly optician. Usually associated with the dexterous or wealthy, made-to-measure has had a recent revival in the form of mass customisation and custom manufacture (see below).

The next best thing to made-to-measure is adaptation to suit, where existing products are modified or customised to match individual functional or supra-functional needs. Customising has always been significant human activities, with the oldest form being the hair styling, cosmetic and tattooing decoration that we perform on our own bodies.

Second only to this are the ad hoc adaptations that people undertake to products to make them work better, or to keep them working. Such adaptations can often be very inventive and sometimes bizarrely so. Designers cannot always forecast how users will use products (refer to Figure 2).

In architecture, writers such as Brand and Alexander have documented, formalised and celebrated the changes that users make to buildings.

Brand states: The word "building" contains the double reality. It means both "the action of the verb BUILD and that which is built" – both verb and noun, both the action and the result. Whereas "architecture" may strive to be permanent, a "building" is always building and rebuilding. The idea is crystalline, the fact fluid. Could the idea be revised to match the fact? [6]

Alexander continues: What does it take to build something so that it's really easy to make comfortable little modification in a way that once you've made them, they feel integral with the nature and structure of what is already there? You want to be able to mess around with it and progressively change it to bring it into an adapted state yourself, your family, the climate, whatever. [6]

We associate the use of buildings with adaptation on all levels, from interior decoration, moving the furniture, adapting spaces, extending the building, knocking down and starting again. Are products amenable to the same process?

For cars, the answer is certainly yes. Custom cars are originally an American phenomenon, originating in post World War Two California. Modifying cars for performance and appearance or to suit the aesthetic predilections of sub-cultural tribal groups was first documented by Tom Wolfe [8]. Drag racers, hot rods, low-riders, hot hatches, rice rockets and dune buggies are all car variants that owe their origins to enthusiast mechanics working in sheds. We can celebrate their inventiveness whilst simultaneously acknowledging some of the unfortunate aspects of kustom kar kulture. (misogyny, speed, danger, fuel wastage, etc)

These ground roots movements have had a significant effect on mainstream car manufacturers, as well as developing a buoyant aftermarket in performance or appearance enhancing bits for production cars. They have also provided endless opportunities for boys to stand in car parks, chewing gum, kicking tyres, shooting the breeze and all the things boys are supposed to do around their toys. They have also given us the verb hot-rod to describe the process of modifying standard products, applicable to many other situations.
How does this impact on product design?

Imagine you are the owner of an 18th century blacksmith’s shop. Every product you make—from horseshoes to cooking utensils—has to be hammered out according to an individual customer order. Now leap on 200 years to a modern car factory, turning out thousands of near-identical products every day with only the most minor variation. Both scenes encapsulate the dominant manufacturing style of their era. Over the years, craft-based making has, for the most part, given way to mass production. But today there is a middle ground. In recent years, customer-focused processes have been married with the notion of cheap and efficient mass manufacturing to create the new technique of ‘mass customisation’ [9].

In the case of car making, as mass production developed, rationalisation reduced the number of car models, the number of manufacturing companies and finally the cost of each vehicle. “Any color you like as long as it’s black” (H. Ford). Japanese car companies took this to the extreme with continuous improvement methods to produce comprehensively equipped cars at competitive prices. Consumers eventually rebelled against this and demanded more differentiated cars with a high level of personal choice of specification and options. Carmakers developed new production strategies to provide this.

Design for variance involves a modular approach. This enables the manufacturer to construct a variety of models from a range of components and assemblies. The basic structural platform of the car can accommodate a range of engines, running gear and bodywork, to create a variety of models. The VW Golf platform (Rabbit in the US) is used to make the VW Golf, Seat Leon, Skoda Octavia, Audi A3, VW new Beetle and the feline Audi TT, with an engine range shared between those and other models in the Skoda, Seat, VW and Audi ranges. There are variations in performance, appearance and servicing costs across the range, depending on whether Czechs, Spaniards and/or Germans wielded the assembly spanners (or programmed the robots).

The same design approach can be extended to become mass customisation that enables the customer to specify their individual requirements from a comprehensive list of options, with the car being built to order before delivery. In the case of VW cars, the progress of the car down the production line is fed back to the customer during the production process. It is even possible for the customer to fly to Wolfsburg in Germany to pick up the car at the end, for the ultimate personal fulfilment and bonding with the product (or to save the delivery charges).

The potential of these user-choice centred production methods to provide a closer match with individual user needs was recognised by Rashid [10]:

When we buy consumer products, we buy into the myth that we are getting something deeply personal because they happen to suit our individual needs, desires, tastes, objectives, fetishes and lifestyles. Deep down though, we know that countless others possess the exact same objects. But with variable production methods, the extraordinary can happen.

The notion that individual products can be assembled from a range of optional components is not new, but this is made considerably cheaper by developments in manufacturing that make providing variations in components no more expensive than reproducing the same ones. Computer aided design (CAD) enables design specifications to be readily changed. Computer aided manufacturing (CAM) enables these changes to be implemented in mass manufacture. Product development can also prototypes production using rapid prototyping technologies, stereo lithography and material deposition methods that enable individual 3D objects to be generated from the information contained in the CAD files.

(Mass customisation) ...is a world in which the unpredictable nature of each customers' demands is considered an opportunity [11].

Within clothing manufacture, mass customisation is now well embedded with user participation at all levels, from personalisation to fit and design. Whilst many people continue to think of the size of their bottom as a problem, Levi Strauss now thinks of it as an opportunity. In the Levi personal fit jeans scheme, customers are measured in a store; their dimensions are computerised and sent to a Levi factory.
The personal pair of jeans is delivered within three weeks, at a mark-up on regular prices. Other companies are working on variations of this by using white light body scanners to determine customers’ dimensions. Some shirt makers now enable customers to choose design and fit options on-screen before their shirts are made up.

The Nike ID scheme enables the customer to access their website and select soles, uppers, colours and labels for their own individual sports shoes, with plans to extend this to provide thousands of product choices. Independent websites such as Customatix.com go further than this with interactive design packages to enable footwear enthusiasts to design their own shoes from the billions of possibilities available.

Of course, wider choice does not in itself guarantee a better fit with user needs. An evening spent with a US television satellite receiver providing 200 almost identical channels will convince anyone of that. At one stage in its introduction of mass customisation to car manufacture, Nissan had 87 different steering wheels available for its cars. Unfortunately, customers did not favour most of them and were frustrated by the process of finding the one they did want by the proliferation of inappropriate choices. The fact that you can get 250 distinctive covers for your Nokia cell phone does not help people with limited thumb movement or visual impairment to use the tiny buttons or the small screen.

Customisation can enable a higher level of individual expression, but the design variances must encompass forms and features that are meaningful to the user.

Design for variance can also mean design for adaptability, for wear and repair, and for evolution and decay. Adaptability is a means to establish much closer connections between users and products, by enabling them to determine appropriate product characteristics for themselves.

Assistive and adaptive design is a long established approach to making mainstream products useable by people with special needs, but it has frequently been difficult to implement and some users have keenly felt the stigma of having to use a different product. Some proponents of universal design have advocated that ideally one design should be useable by all but this has been found to be both unattainable and even inappropriate in many situations.

All users have individual needs, so products should be adaptable to suit those needs. It is essential for the full realisation of the objectives of universal design that product variation satisfies the widest possible user population. This would ensure that the fit between users and products is better for all, rather than providing a good fit for the majority and a continued marginalisation of minority users.

Universal Design is, in fact, about individualisation through diversity, different designs for different users within the same system [12].

Design for adaptability has positive implications for the agenda of sustainable design. As long as the means by which choice is provided is not wasteful of materials or involves excessive design redundancy, the adaptation of products to suit changing user circumstances is a positive benefit. A user could change product components in response to wear, the availability of components with improved performance or a number of other factors.

The use of modular assembly will facilitate this updating enabling people to repair, refresh or even recycle their products, rather than replace them. Alastair Fuad-Luke [12] includes encouraging design for modularity as part of his manifesto for eco-pluralistic design.

Some manufacturers already ensure that all improvements to their products can be retrofitted. Linn, the Scottish audio company, has produced the LP12 turntable for some 25 years now and whilst the current version has an external resemblance to the original model, very few original components are still used. All improved components can be fitted to the earliest models to bring performance up to the current level.

As well as reducing the effects of obsolescence in generating waste, this approach has commercial benefits in establishing close links between the user, dealer and manufacturer, cementing brand and product loyalty. Some sceptics with a green bias may query citing a hi-fi manufacturer as an ecological warrior, but the alternative may well be mountains of discarded hi-fi components.

Beyond mass customisation to custom manufacture

In industrialised societies, the historical development of product manufacturing can be characterised by the diagram which shows that production methods have come full circle or full spiral, to be more exact.

The new production technologies developed for CAD/CAM, flexible manufacturing, mass customisation and rapid prototyping will facilitate custom manufacturing on an unprecedented scale.

Rashid [10] makes connections between these future developments and the significant effects that desktop publishing and domestic digital sound recording equipment has had in the democratisation of text and music publishing, coining the term desktop manufacturing to describe it.

'It seems entirely plausible that the personalisation afforded by desktop publishing will be forwarded by desktop manufacturing. 'A digital office directed by specialized software will soon be capable of developing, designing, and producing actual objects or three-dimensional artefacts. (We can presently simulate 3-D models with stereo lithography, which is used for rapid prototyping.) The cost of purchasing CAD-controlled 3-D routers, used by woodworkers, model makers, sign shops, and other manufacturers, is decreasing dramatically. When desktop manufacturing is reality, we will be able to design and develop for our own needs with incredible specificity.' [10]
One designer working in London demonstrates these possibilities very effectively. In an article for the Telegraph magazine Ali Watkinson describes the work of Oliver Geoffroy [14]. Working in a semi-derelict building Geoffroy uses CAD/CAM software to programme a computer numerically controlled (CNC) milling machine in the basement to produce intricate and individual furniture in wood, plywood and plastic materials. The tight tolerances of CNC machining allows for easy self assembly of accurately made components by customers whilst the production technology allows for production to order or for just-in-time delivery. A range of innovative designs, the means of producing variants if required and no stock problems are the result. This takes the work of individual crafts people into the new area of cyber crafts where the execution of an individual design does not depend on the making skills of the individual crafts person, but can use the range of new manufacturing techniques, as directed by the designer.

Many of our iconic products started in sheds of course, (Hewlett Packard, Apple and JCB), but this is now easier than ever before. This is the point of contact between design, production and the world of the do-it-yourself and customising subcultures. No surprises there, when you think of those iconic products created by people modifying existing products to produce something better (Hewlett Packard, Apple and JCB).

Developments in information technology have also contributed to an escalation in the scale and significance of this activity. Easy access to information from the Internet about products, manufacturing methods, component sources, design expertise and other users, generates a multiplicity of dialogues and possibilities. If you are a Smart car owner you can add to the customising possibilities that are facilitated by the manufacturer those that exist on the websites of the enthusiast clubs and the after market suppliers. As Smarts are raced in Germany, you can search German websites to tune, turbo-enhance and re-chip your humble Smart car to go at 120 mph. For all of us, connection with a global network of experts, other users and specialist component suppliers is now easy.

The manufacturing strategies of many companies rely on global connections with manufacture dispersed across the world, so the extension of this to designers, micro-businesses and individuals is both logical and inevitable (as is the extension of the logistical, financial and quality problems associated with long-range manufacture).

The Internet also enables people to connect with producers in the developing world to buy products made there. In an article in the Guardian newspapers [16] cites the report of UNCTAD (the United Nations Conference of Trade and Development) in the development of e-commerce in the developing world.

The article gives examples of websites set up to bring e-business methods to small-scale craft producers in North Africa and India. Elsouk started as a virtual shop in 1997, funded by the World Bank for makers in Morocco, then Egypt, Jordan, Tunisia and Lebanon. It has now mutated into several localised websites [17]. Indiashop [18] was set up to enable Indian women sari-makers to sell direct on the Internet, cutting out the chain of middlemen that resulted in a ten-fold increase in the price paid by the retail customer.

"(IndiaShop) visited the (sari-maker) in Kancheepuram and told her about the project. She was very enthusiastic and allowed up to take photographs of the saris she was making. We posted the details on the IndiaShop website, and within about two or three months we were able to get an order for two saris for the weaver at a very good price. The weaver is very happy and is now regularly in touch with us to provide details of the new designs she's producing." [16]

Key to making these developments work has been ensuring the security of financial transactions and sorting out the
logistics of transporting finished products around the world. The good news is that these problems are soluble and the potential impact on economic development is enormous.

CONCLUSIONS AND RECOMMENDATIONS

There are many ways in which people find pleasure in products. They will continue to value the inspirational innovations produced by designers making empathetic creative leaps and divining needs they never knew they had, or realising them in ways they never thought were possible. On a personal level, the authors can envisage endless numbers of ways to design and make a chair. It does not mean that, we will do that rather than go out and buy Philippe Starck's latest polymer creation.

But people also find pleasure in products that fit them ergonomically, that they can specify for their exact visual requirements, that evolve as their needs change, that age gracefully, that can be upgraded, repaired and recycled without the need for specialist intervention, that they make and change themselves, that involve them emotionally, whether it be in brand, cult or enthusiast group.

Design is too important to just leave to designers. User-centred design is important in involving users-as-experts, and universal design equally important in reducing discrimination by design, but the challenge for the future will be how designers relate to users within the new paradigm of production.

As user responsive production methods become more prevalent, designers could move from a role as the advocate or interpreter of user needs, to one of an empathic and inspirational facilitator, providing tools and strategies for users to realise their own needs.

This broadens the spectrum in which designers can operate in relation to users, from individual creators at one end to supportive creative facilitators at the other. Operating at any point on that spectrum involves creativity, analytical ability, knowledge and insight, as well as the ability to communicate and work with others. The empowerment of users is a shift towards shared ownership of the designing process. In addition to this, the new production technologies also create opportunities for designers themselves to realise their own design ideas. Pleasurable products? We could soon be awash with them.

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USING FOCUS GROUPS TO SUPPORT THE DESIGNER IN THE EVALUATION OF EXISTING PRODUCTS: A CASE STUDY

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This paper describes a case study which explores the potential of focus groups for assisting the designer in gathering data, in this case on the reaction of typical end-users to small domestic products. The designer worked directly with the groups as moderator, the logic being that in this way an enhanced understanding could be developed of the reactions of users and an improved empathy for the requirements of users from outside the socio-economic group most designers occupy. The paper firstly gives a background to focus groups as a data collection method. The methodology of the case study focus groups is described including the guiding objectives and methods of gathering and analysing data. The data from the focus groups, which is qualitative in nature, is examined. From this a discussion is conducted on the potential value of the focus group in this context and in the training of designers.

INTRODUCTION

"...Focus group discussion is particularly effective in providing information about why people think or feel the way they do." (Krueger, 1988)

This paper aims to explore focus group activity as a method of data-gathering in a design context. It has relevance for the practising designer, design educator and for the student designer.

Focus groups are increasingly used in commerce and politics, though commentators vary in their opinion of the effectiveness or value of the process. In this context moderators who are typically social scientists normally run these groups. In this case the primary author aimed to explore the potential of using focus groups to support the designer and, more specifically, the effects of using a designer as the moderator. The logic was that the designer, unlike a non-designer moderator, could respond in an opportunistic manner (Cross and Clayburn-Cross, 1995) to explore design issues which emerge.

OBJECTIVES

The objectives of this paper are to evaluate the potential of focus groups:
in gathering useful design-related data directly from users
- in raising the designer's understanding of and empathy for users from differing socio-economic groupings
- to explore the value of using a designer as moderator of focus group discussion.

The paper is primarily concerned with the focus group method and its value to the designer, design educator and student, rather than the points generated by the focus group used in the case study. Nevertheless, a number of findings from the focus groups are presented in order to illuminate the first objective.

**BACKGROUND**

A designer comes to a project with a certain amount of understanding and awareness of the design problem, context and user. Designers must identify key areas that need to be explored which may be very different to their own experience. It is not only important to be aware of the limits of one's knowledge but also to have the skill to explore the new context using or developing the most appropriate methodologies. Design projects often involve unique problem-solving situations and this is when designers must not only be innovative with use of materials and design, but creative in the way they gather data and illuminate the context.

The designer is effectively a designer-researcher, but operates with a different agenda to the academic researcher. The academic must demonstrate reliability and validity in their findings; the designer, however, is tested in the marketplace. The precious ability of designers is to utilize research yet respond intuitively, feeling the right concept, relying on a *sixth sense* and *gut feeling* (the authors have used these terms deliberately to project the intensity and intuitive aspects of designing). The effectiveness in which the designer can do this is to some extent dependent upon building experience, which may feed empathy. Industrial design has conventionally relied upon this ability to sense. The authors suggest that evidence-based design decision-making is an important part of building experience which then can be tapped subconsciously and intuitively.

Working as a design team brings the potential to cover a broader range of experience. However, even here designers will tend to be from similar cultural backgrounds and will therefore need to use a variety of techniques to explore the broader culture. The authors suggest that an individual designer has an empathic horizon (Figure 1), which can be expanded using appropriate methodologies (Wengraf, 1990). This horizon could be defined as the individual's range of understanding of user experiences in different contexts.

For example, can a white, middle-class, male, abled designer design effectively for an elderly disabled person? The answer is yes, to a degree, however, by employing various techniques the designer can begin to expand that understanding and horizon and design more effectively in that context.

Focus groups are groups of individuals that have been brought together to discuss specific topics. The method

![Figure 1. Empathic horizon of the designer.](image-url)
relies upon participants interacting and generating a synergetic effect (Driskell, Hogan and Salas, 1987; Hackman, 1983; Hampden-Turner, 1971; Shaw, 1971 and Kitzinger, 1994). Moderators are used to chair the activity, encourage discussion and interaction. Focus groups like design teams use social processes with all the positive and negative potential raised by Cross and Clayburn-Cross (1995). The moderator's schedule normally contains a collection of open-ended questions, opportunities for introducing structured and semi-structured questions. It ends with a short debrief to enable all participants to voice any unheard views or comments. Moderators tend to be brought into the research programme to conduct these meetings; these tend to be specially trained and would not necessarily be designers. Often individuals involved with the research will observe the proceedings in another room, viewing through a one-way mirror, or sit quietly within the same room and observe. Introducing a designer-researcher-moderator provided a basis for this study in the context of focus groups used to support a design process. How beneficial would this method of eliciting data from users be? Can a designer-researcher moderate such a group activity effectively?

The designing process is not prescriptive; it relies on the individual or team to utilize appropriate methodologies. Focus group work is an activity that has not fully been embraced by the designer as a data-gathering tool within the designing process. When it has been used it is usually in the form of market survey work on pre- and post-production products: the data then being fed by specialist staff to designers/design teams. For this paper the focus groups were used to gather data on existing products, but it is intended that this preliminary study will begin to illuminate the potential for such activity at various other stages of a design process.

Research involving group working is made difficult by the highly individual nature of the interaction of members. It is possible to categorize members on the basis of factors such as age, gender, socio-economic grouping, education, etc. However, the more factors considered, the more complex the task of analyzing their effects as they interact. A different approach is to identify only those factors which appear to differentiate members over any specific issue. These are referred to as 'break characteristics' (Knodel, 1993). Knodel observes that:

"If the study design involved a set of break characteristics used to differentiate subsets of the target population, an important part of the analysis will be a discussion of the similarities and differences between the groups involving these various subsets. Note comparisons are not necessarily made between every unique combination of break variables but instead between clusters of combinations."

When similar opinions are expressed by different subsets of people, despite the many differences that characterize interaction in any two sessions, it is likely that views or experiences are being tapped that are common to a shared underlying culture within the broader population. It is appreciated that characteristics such as personality may be influential but it would be difficult to make a multi-characteristic comparison due to the scale of this project.

**METHOD**

There are two parts to this section:

- focus groups methodology
- the focus group as a case study.

To some extent the two aspects blend into each other. For example, output from the focus group was gathered by video: this same video material also provided data for the case study.
FOCUS GROUP METHODOLOGY

The study involved 60 participants (30 females and 30 males) in groups of 6 to 8 participants. The criteria for selection were that individuals should be home owners (and, therefore, likely purchasers of domestic products) (MINTEL, 1996), in employment (full- or part-time) and reside locally to the university. Each group was either male or female in composition, in order to promote discussion by minimizing any gender interaction effects. The participants were randomly mixed in terms of occupation, age, health, etc. Groups met in evenings or weekends when the majority found it more convenient, in an attempt to reduce the possibility of occupational effects.

The guiding objectives for the focus groups were:

- to elicit user perceptions on a range of small domestic appliances
- to become familiar with the language of the user
- to gain experience in managing such a group and activity.

These objectives were used to generate a moderator's schedule for the group session.

A key aspect of the research, however, was that in this case the moderator was a practising designer and that there were separate research objectives, which guided the methodology of the focus group. There are therefore, two principles guiding the methodology: the research and the focus group task itself.

Participants were informally met by the research assistant, assisted to the room and when all were present the moderator conducted a general introduction. An identical process was followed with each group. Each group completed a booklet consisting of response sheets. This focused upon three product categories - toasters, coffee makers and kettles.

The individual products were chosen for their appeal to the general purchasing public thus avoiding more conceptual products that might be referred to as non-mainstream (e.g. Philips, Alessi or the Siemens Porsche kettles). A slide presentation (visual questionnaire) of the products was shown to each group. This was followed by a group discussion (focus group), and assessment of the products directly (product handling). This paper focuses on the focus group aspect.

The focus groups were video recorded, with their agreement. Audio recordings were also made as a standby if the discussion on the video recording was indistinct. From these recordings it was possible to extract observations and, whilst reviewing the recordings, make comments on both verbal and non-verbal reactions. Initially both authors reviewed the first tape independently in a non-structured manner. The only guide was that both were to identify group interaction, the group product (in terms of points generated) and the effect of the moderator being a designer. These were then compared and an initial categorization established, discussed below. The remaining recordings were then analysed on the basis of that categorization; this was qualitative in nature and took the form of observations based on verbal and non-verbal data. A series of iterative meetings was then used to simplify the data within these categories to arrive at a set of key points raised in each category.

CASE STUDY METHODOLOGY

The authors based the study on Hopkins and Bollington's (1989) five-part structure:

- a preliminary, anticipatory stage
- immersion in data and the generation of categories/hypotheses
- validation of categories/hypotheses
- interpretation by reference to theory, practice or professional judgement
- action for improvement and presentation of theory.
The recordings of only four groups (sessions one, three, five and eight) were used in the case study because of the time-consuming nature of this type of work. The choice of group was based upon ensuring two of each gender and spread over the range of groups. The authors reviewed these recordings (equating to the preliminary phase) as a part of the focus group method described above. They also looked at the way in which the designer-moderator worked with the group in order to elicit data on the value of using a designer as moderator rather than a non-designer specialist. This was supplemented by self-reporting by the designer-moderator.

The authors then met again and entered Hopkins and Bollington's second phase - immersion in the data and the development of the Initial categories. This involved a number of meetings where individual analyses of episodes in the recordings were compared.

The third phase of validation of the categories followed on in the form of back checking the data in relation to the research objectives. This stage led into one of interpreting the data by reference to theory, practice and professional judgement. This is outlined in the discussion section below.

The categories of data developed were cost (including

### RESULTS

The findings generated from the group activity were qualitative in nature and from a small purposive sample. Critics of focus group methodology often concentrate on the lack of reliability and validity in the findings; however, the purpose of such a method is to gain an overall awareness of particular user experience. These findings could be either used directly or provide the basis for subsequent focused studies.

The raw qualitative data was directly analysed by the authors resulting in a series of statements initially classified into six groups, which were further condensed to four (see next page) considered to be reasonably inclusive categories. These represent the output in relation to the designer-moderator's first objective: to elicit user perceptions on a range of small domestic appliances. Results in relation to the second objective, to become familiar with the language of the user, are less easily reported. The initial notes, whilst not verbatim transcriptions, did include many direct quotations. The designer-moderator also completed a self-report, which was compared with the notes made by the second author in analysing the recordings. The designer-moderator went through a series of iterations in relation to all three objectives, firstly directly with the group, when observing the recordings and the various stages of reduction of the notes taken from them. Similarly data in relation to the third objective, to gain experience in managing such a group and activity, comes from this same process. The data is not presented in its raw form in this paper.

The categories of data developed were cost (including
aspects of function relating to cost), appearance, lifespan (including brand, maintenance, materials and expectations) and function (relating to ease of use). These categories are a loose fit in that some factors might fit within two or more, however, in order to simplify a mass of data they were found to be manageable. The final category was data relating to the designer as moderator.

**DISCUSSION**

This section is structured in relation to the three research objectives.

**THE POTENTIAL OF FOCUS GROUPS FOR GATHERING USEFUL DESIGN-RELATED DATA**

In order to gain an impression of this potential it is firstly necessary to report some of the key findings from the focus groups. These have been organized into the four sections reported above. Many of the more obvious points have been left out though it should be appreciated that even these might have value to the designer in confirming assumptions made.

Cost. There was a general enthusiasm for co-ordinated group styling of products but there was resentment of associated retail policy. This was evident across the range of social classes within the sample. Because such product ranges were retained for a limited time members complained that they were unable to replace damaged items with identical new items. Any product breakage requires investment in a whole new range if a co-ordination is to be maintained. The types of products considered in this study were typical of those with limited retail periods.

- A majority of products were perceived as being aimed at the affluent purchaser/consumer.

- There were indications that purchasers remember the quality of the product long after they have forgotten the price they paid.

- Many small products (e.g. kettles, toasters) were purchased as gift items. The purchaser would probably have different selection criteria to the end-user. Groups also reported a dislike of purchasing gifts. This underlines the need for designers to consider the possibility that products may be purchased as a gift.

- Many mainstream products such as kettles are perceived as mundane and purchasers are less prepared to invest time in careful selection.

- Females report a wish for uncomplicated product functions, but also report that such features draw their initial attention to a specific product. They report the marketplace to be saturated with similar products making selection difficult.

- The focus group findings indicated that impulse buying was restricted to a few luxury items such as coffee makers within the range of products being considered by the group.

- Females perceived over-elaborate features as being male orientated and gadgety. Males reported less interest in the purchasing decision process for the more mundane products, but more interest when the product was more gadget orientated. Female subjects confirmed that the above was also the case with their partners when purchasing products.

Appearance (co-ordination with other products, materials, colour).

- Both genders report appearance as the first factor in being drawn to a product. It was very clear that males immediately then moved to a detailed analysis of the product. Such analysis by the males proved to be almost
completely negative: looking for potential faults and limitations. Females analysed products on a more holistic and generally positive level.

- Females responded to products using a range of senses, in often a sensuous manner. This was very clear from the video analysis (both in verbal and non-verbal communication). They exhibited a very tactile approach to materials and showed a tendency to bond with particular products.
- The use of colour highlighted certain perceptions. A dark coloured product was considered to be more robust than lighter ones.
- The use of black was perceived as being masculine and targeted at male purchasers (e.g. televisions and stereo systems).

**Lifespan** (brand, maintenance, materials, expectations, age, experience, gender).

- Plastic products were perceived as less reliable than comparable stainless steel products.
- Female users demonstrated a remarkable willingness to accept small faults and would only replace products when there was a fundamental failure. This was very apparent with older users; younger users were much more prepared to replace when dissatisfied in any way.
- Certain brands were perceived as more reliable. Dyson was building a reputation amongst users for reliability. Older users were less receptive to such new brands.
- Availability of certain products within particular ranges can prove problematic when replaced by newer styles (see also Cost).
- Users do not expect products, particularly plastic, to last more than two years. This appears to be accepted, though resented. The younger users expect to replace products after two years on the basis of changes in styling.

**Function** (ease of use).

- Females demonstrated a contextual consciousness when considering purchasing products, whereas males focused upon specific functional needs be fulfilled.
- Some of the older users, particularly males, appeared to accept the performance of older products and were unaware of recent improvements in performance and features.

It is debatable as to whether a designer would independently identify all the points raised by focus groups. Patton (1990) stressed the value of focus groups' ability to generate qualitative data, which can be rich in value. The sample of findings reported above does raise points in relation to how potential customers can be attracted to specific products in what users see as a product-saturated marketplace. Similarly, points are raised on the way the different genders examine products prior to purchase along with points on age and socio-economic class differences.

Cost-benefits analysis of focus group output is difficult due to the nature of data generated. The sample reported above is small and whilst efforts were made to achieve a balance of gender and socio-economic groupings the data does not yet reliably reflect the population it represents.

The findings could be followed up with questionnaire techniques with statistically viable samples, in which case the focus groups will have been valuable in helping focus questions. The true value of focus group output is, however, difficult to assess. There may be points which can set a designer off on a specific and original track, but most of the output is probably of more value in illuminating the market context, and particularly the ability of the designer to understand users in different gender and socio-economic groups.
USING FOCUS GROUPS TO SUPPORT THE DESIGNER IN THE EVALUATION OF
EXISTING PRODUCTS: A CASE STUDY

THE POTENTIAL OF FOCUS GROUPS FOR
RAISING THE DESIGNER'S UNDERSTANDING
OF AND EMPATHY FOR USERS FROM
DIFFERING SOCIO-ECONOMIC GROUPINGS

Designers and products exist within a variety of cultures
(Wallendorf and Arnold, 1988) which are still highly
structured. The users involved in this exercise clearly
demonstrated, through verbal and non-verbal communication,
their class location. 'Professional' users were more dominant
and non-professionals (manual workers) appeared less
confident and less able to express themselves within the
context of these groups. Whilst the moderator worked at
drawing non-professional workers into discussion, this
indicates that output from the groups was skewed towards
that from professional classes. Non-professional workers
may be more active if they operated in peer groups. This, in
turn, raises the issue of whether a designer (a professional
worker), acting as moderator, can promote active discussion
amongst non-professional participants.

As indicated above the designer-moderator went through
an iterative process, initially in direct contact with the
groups and, subsequently, in terms of self-reporting and
data extraction and reduction. The moderator considered
this iteration to be valuable in assisting further analysis.
Whilst the method was time-consuming, with these lessons
learned subsequent groups moderation and analysis could be
more productive in relation to the reactions of differing
socio-economic groupings, their language and priorities.

THE POTENTIAL VALUE OF USING A
DESIGNER AS FOCUS GROUP MODERATOR

This section is derived from the video recording analysis
and the designer-moderator's self-report. Whilst the data
generated many points in relation to improving the value
of subsequent focus group work, in this section only those
points directly concerned with the value of using a designer
as moderator, and not previously discussed, are included.
Appropriate areas for discussion were identified as training
for the role, language, gender, cost and flexibility.

Whilst training in the role of moderator is given by the
Association of Qualitative Research Practitioners (AQRP),
it is the authors' opinion that the process should start at
undergraduate level with designers of all types learning,
as suggested by Swales (1999) in relation to
ethnographic techniques.

Training for the role. The designer-moderator had
received training for the role of moderator through the
AQRP. The video data revealed that, even after that training,
the management of the groups was a very intense experience
with the moderator having to constantly struggle to keep the
schedule. This reduced the number of times the moderator
was able to use experience as a designer to follow up on
points raised in an opportunistic manner. Similarly, this
means the designer-moderator was not able to use the
interaction within the group to build concepts much as
Cross describes with design teams. Some of the potential of
using the designer as moderator was therefore lost. However,
there was a clear development in the moderator's ability to
manage the group and give time to explore design-related
points over the eight sessions in the case study. This
indicates that training in moderation skills are valuable,
but even then a learning curve must be anticipated before
a designer-moderator can work to a high level of effect.
Each group session in this study was 45 minutes and the
designer-moderator kept accurately to schedule. This was
too short and a period of 90 minutes would allow the
designer-moderator, once that basic experience had been
gained, to explore emerging design-related points far
more effectively.

In this case study the organization and the designer-
 moderator as researcher carried out administration of the groups. This involved identifying and contacting potential members, organizing the sample into groups according to the criteria chosen and designing the sessions and supporting resources. Managing the focus group sessions also required detailed logistical planning. An assistant was used in the sessions to receive any late-comers, respond to hospitality requests, ensure the activity is photographically recorded and so on. Obtaining such support does contribute to the overall cost of running such sessions, but proved a valuable contribution.

In regular practice, appropriate administrators could complete all the background work so that the designer-moderator would only be used in the actual sessions. The designer would not necessarily be involved in the early stages of data extraction, though there would be advantages in being involved in the reduction of that data. The high time consumption involved in this case study could then be reduced considerably for the designer.

Language. The sessions certainly provided the opportunity for the designer to become aware of the language of the user. The designer was able to hear and see how users describe and react to certain products, hear their experiences and views on specific materials and so on. Similarly the designer reported it as being valuable to be able to communicate almost immediately mirroring the users use of terms and language. This was one of the main objectives of this exercise and it was considered successful in tapping into such a resource. The limitation of differing socio-economic group participation, described above, could be mitigated by specific group selection methods.

Gender. In this study the designer-moderator was female and the eight sessions comprised single gender groups. Male groups may have responded differently had the moderator been male. This would make an interesting follow-up study, building understanding through the accumulation of and comparison of case studies as suggested by Stenhouse (1983). Video analysis showed the designer-moderator using various standard techniques to relax groups and encourage contributions from all members and discussion between them. The factor which appeared to most strongly correlate with an individual’s contribution to discussion was not gender but socio-economic class.

A number of other interesting gender effects were noted in the case study. The designer-moderator had to work hard to re-focus male groups once they started the detailed analysis of products. As indicated above they had a strong tendency to be negative in criticism and would continue the process to great depth if left to it. Males found it very difficult to suggest improvements to products after analysing them. Females analysed products very differently, as reported above, but were able to make some positive suggestions for improvement. At one point the schedule required members to imagine the products had personalities and describe them. Females found this exercise easy, but males had considerable difficulty. This may either be due to a difficulty imagining such a situation or a reluctance to report on it to the group or to a female moderator.

Cost. Using a designer as moderator clearly has negative features in that it moves the designer away from their primary professional expertise. Focus groups should not be perceived as a quick and inexpensive method for obtaining data. With research participants being paid per session, hospitality costs, research assistant costs and so on, the initial expenditure can be relatively high. Transcriptions of the proceedings have to be considered when estimating the costs.

Flexibility. As mentioned earlier, the focus group
sessions were set at 45 minutes in the planning stage and in an attempt to ensure that sessions were comparable the designer-moderator kept to this schedule. As indicated above, this meant that the designer was unable, on many occasions, to follow up design-related points. An alternate research design in which sessions could be iteratively developed may have been more productive. The value of using the designer is lost if that person is too tightly bound by a schedule. Time must be available to explore emerging points.

CONCLUSIONS

In relation to the objective of gathering design-related data directly from users, an informed designer could have reasonably predicted much of the data generated. It is also recognized that the method as applied has limited validity in relation to the market in general and any precise description of decision patterns. However, new insights were gained and the results could further strengthen evidence-based design decision-making. For example it may be assumed that couples purchase these product categories after a process of joint decision-making. However, this study indicates that most small domestic appliances (especially kitchen-orientated ones) are purchased solely by the female even if their partner is present. Males tend to enter the decision-making process only when considering brown goods (e.g. stereo systems, televisions).

The time, and therefore money, required to establish, run and extract data was considerable, but the cost/benefit equation is more complex. Firstly, in a professional design context, specialist moderators could be used in conjunction with the designer as indicated above. This means that the designer would be used only for those specific aspects in which design skills are needed. Secondly we should see experience of working with such groups and analysing their data as valuable long-term training for designers. It produces an evidence base for decision-making but also builds designer’s experience and, possibly, their ability to apply that experience in future contexts in both a conscious and sub-conscious manner. It may feed that ability of the designer to apply intuition effectively and accelerate design work.

In relation to the objective of raising the designer’s understanding and empathy for users from different socio-economic groupings, this process, whilst resource consuming, was beneficial in a variety of ways:
- the designer reported an increase in confidence in designing for different socio-economic groups
- the designer gained from direct contact with the users, generating unedited, raw data.

In relation to the objective of exploring the value of using a designer as a moderator, the case study shows the need for training in the role and that, even then, a learning curve must be accepted. Initially the designer-moderator will tend to focus on the process of managing the group and be less able to make maximum value of their specific professional skill. There was evidence, however, that in these case studies the designer was reaching the stage where it was possible to probe further and follow up design-related points. Time was a particular factor. These case study sessions were too short for their objective. Deciding on the time required for such work comes with experience. There is a case for a designer-moderator to work closely with experienced moderators in planning focus group schedules and relating them to time requirements.

An interesting extension to the case study would be to look at the use of focus groups and a designer-moderator in other phases of a design cycle. Focus groups could give feedback on initial ideas and help a more precise direction.
Similarly fine design detail could be tuned prior to final production.

The methodology of the case study could have been improved by iteratively responding to each session. For example, it became clear that 45 minutes was inadequate to complete the task while allowing the designer-moderator to explore design issues appropriately. Rather than maintain this period over the 8 sessions it may have been better to extend, initially to 60 minutes, and observe the effect. This could have been done once confidence had been established in so far as it was the time period and not other factors that were preventing the designer from exploring issues. Similarly the effect of gender might have been explored using some mixed groups, though age, personality and professional/non-professional status appeared strong factors in relation to members' ability to express themselves. Socially engineered homogeneous groups may be a more effective way forward in relation to maximizing the output from non-professional workers.

In conclusion, there were clear benefits from the use of focus groups in that useful design-related data was gained; the designer-moderator did learn something of the way in which a range of users related to certain products and experience was gained of the methodology of focus groups. The study also showed the time-consuming nature of such work and that experience needs to be acquired before significant gains can be made. It is important to recognize the less obvious benefits in terms of the designer expanding experience and empathy for the users. Most design training involves student designers working with clients, usually manufacturers. Such training rarely insists on students working with end-users. From this study the authors conclude that such activity would be beneficial and also that involvement in focus groups could help develop the designer in professional practice.
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BIOGRAPHY

Deana McDonagh-Philp, BA, MSc, MIED, is a lecturer at Loughborough University in the Department of Design and Technology on the BSc/BA (Hons) Industrial Design and Technology degree programmes. She is an industrial design practitioner and design researcher, and a member of the Institution of Engineering Designers and the Association of Qualitative Research Practitioners. Principal areas of research are gender and design, focus group work, user involvement within the designing process, user-centred design methodologies and the emotional domain of product and industrial design.

Howard Denton, BEd, MPhil, PhD, is programme leader for the Industrial Design and Technology with Education Programme at Loughborough University. His main teaching interests are training teachers of design and technology and the teaching of design practice. He has gained considerable experience in programme development in these areas. His main research interests lie in the areas of group and team working in design practice and design and technology education. In addition he has worked and published in the areas of simulation and design, ergonomics education and design and technology teaching and learning at school and undergraduate level.

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Focus groups to support the industrial/product designer:
A review based on current literature and designers’ feedback.
Focus groups to support the industrial/product designer: a review based on current literature and designers’ feedback

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Abstract

Focus groups are widely used within human factors, social sciences and market research. Whilst user-research methods may be familiar to other disciplines, conventional design training has not, until recently, incorporated such activities. With the increased awareness for the necessity to elicit user needs beyond the functional, design research is becoming more established. However, there is a significant gap in training material for design research. This paper will review the scope of application of focus group techniques, with particular emphasis on the suitability of focus groups for use by industrial/product designers, based on the current literature and designer feedback from two case studies. © 2001 Elsevier Science Ltd. All rights reserved.

Keywords: Focus groups; User-centred designing; Design research

1. Introduction

The quality and effectiveness of design solutions rely, to a large extent, on the availability of information about the future users of new products. Designers cannot always be knowledgeable about user needs and aspirations. They may benefit from carrying out user research themselves, or being very closely involved in such activities.

The procedural literature available about focus group techniques, such as Morgan (1998a,b), Krueger (1988, 1998a-c), Krueger and King (1998), and Greenbaum (1998), is currently not tailored to the specific needs of designers or design researchers.

The findings discussed in this paper are based upon a research project (funded by the Engineering and Physical Sciences Research Council) that concentrated on the development of methods based on focus groups that suit the needs of designers. This technique has been adapted and combined with a variety of other techniques, such as visual product evaluation and the use of mood boards. They were developed, evaluated and tested through a ‘live’ design project for a range of consumer products (i.e. kettle, toaster and coffee maker). The team comprised of an ergonomist, industrial designer, and industrial design researcher.

This paper reviews how focus groups and related techniques are currently being applied for product development by market researchers and human factor specialists—to give the reader an overview of the approaches available. It draws upon a variety of studies presented in the current literature.

Moreover, this paper presents the results from two case studies conducted by the authors that elicited designers’ perspectives on employing user-research methods based on focus group techniques—to set out the requirements for adapting the techniques according to the designers’ needs and suggestions. In order to encourage the application of research activities throughout the various stages of designing, it is crucial to build on designers’ skills, knowledge, and perceptions. Detailed feedback is presented from the following case studies.

Case study (1): Practicing designer interviews. An introductory case study was conducted to understand the information requirements of designers, their preconceptions towards focus group techniques and user...
The majority of them had industrial placement experience. They were presented with an overview of the project, seven students from the undergraduate industrial design course at Loughborough University were selected to take part in a focus group discussion. The majority of them had industrial placement experience. They were presented with an overview of the project. Seven students from the undergraduate industrial design course at Loughborough University were selected to take part in a focus group discussion. The majority of them had industrial placement experience. They were presented with an overview of the project.

2. Focus groups supporting designing: perspectives from current literature

2.1. Characteristics of focus groups

A focus group consists of individuals, who have been assembled to discuss a particular issue or concern. A moderator, who leads the group through a number of topics and activities, guides the discussion. The synergy between the participants (the interaction through sharing and comparing of ideas) is one of its distinctive characteristics. Participants stimulate and encourage each other. The technique is suited for exploratory purposes, as questions with an open-ended nature can be examined. The information gained is qualitative, and consists of experiences, opinions, ideas, and motivations for behaviour, rather than 'figures and facts' (Morgan, 1998a). It is not suited to be quantified or generalised.

Focus groups have been widely used—the scope of applications is diverse (refer to Table 1 for an overview). They are a well-established technique in market research for the designing of new products (e.g. Savage et al., 1995) as well as for human factor research and usability evaluation (Jordan, 1998). Even though there are many overlaps, human factors research focuses more on the details of ease of use, whilst market research concentrates on the potential success of the product in the market place.

2.2. The involvement of designers

Garner and Duckworth (1999) found that recently graduated practising industrial designers consider themselves as poor researchers and would now view researching skills as an important aspect of design education. The importance of designers working closely together with market researchers and human factors specialists is widely recognised (e.g. Donnelly, 2000; Dolan et al., 1995; Leonard and Rayport, 1997). Porter (1993) and McKenna (1990) stress that the qualitative information from techniques such as focus groups is particularly vital for design decision-makers, hence, designers should be closely involved into the information gathering process. Quantification of results may contribute to loss of in-depth information, as vital insights into attitudes and perceptions of users tend to be filtered out in the process. Likewise, it is beneficial to make use of the creative capacity of designers when acting as facilitators (Carmel et al., 1993).

Designers benefit from taking part in the sessions—either by

- observing sessions (Wilson and Callaghan, 1994),
- providing responses to users' questions during the sessions (Sato and Salvador, 1999),
- actively taking part in the discussion (Caplan, 1990; Sato and Salvador, 1999),
- working directly with users in participatory workshops (Fabius and Buur, 2000; Burns and Evans, 2000), or by
- acting as a focus group moderator (MERCI, 1997).

Focus group activities offer designers a flexible range of techniques that can be utilised throughout the designing process, from pre-concept generation stages through to final concept refinement. Giving designers early access to knowledge collected from users through taking part in sessions, as well as encouraging designers to formulate questions, ensures that the data obtained is well tailored to the specific information needs of designers. Moreover, focus groups are suitable to understand user needs beyond the functional, such as customer delighters (Burns and Evans, 2000), leading to products providing enjoyment as well as functionality (Jordan, 2000). Because designers tend to have a particular profile (e.g. white, male, middle class), it becomes even more important for them to gain such exposure to users. They need to recognise situations where their empathic horizon needs to be expanded (McDonagh-Philp and Denton, 1999).

2.3. The various ways of applying of focus groups

Focus groups can inform the designing process at various stages. They can support designers in understanding user needs at the outset, and can be re-applied at later evaluative stages (e.g. Savage et al., 1995; MERCI, 1997). In practice, focus groups can be linked with other techniques to support the discussion, triangulate data, or add insight through a variety of additional activities (see Table 1). Beyond that, they may be modified through the use of scenario techniques (e.g. focus troupes—Sato and Salvador, 1999) or participatory design approaches (e.g. Fabius and Buur, 2000).
Table I
The use of focus groups in various disciplines related to designing: an overview

<table>
<thead>
<tr>
<th>Source (authors)</th>
<th>Field of application</th>
<th>Details of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martel (1998)</td>
<td>Human factors (electrical appliances at Whirlpool)</td>
<td>Used focus groups as part of a comprehensive user research strategy parallel to a variety of other methods (e.g. home observation, evaluation of previous products, benchmarking)</td>
</tr>
<tr>
<td>Arnold et al. (1994)</td>
<td>Human factors (information systems for public transportation systems)</td>
<td>Used a combination of task analysis, travel observations, focus groups discussion, system evaluations, simulation (using inexperienced users), and operator and product developer interviews</td>
</tr>
<tr>
<td>Nielsen (1997)</td>
<td>Human factors (software and interface design)</td>
<td>Emphasised that focus groups should not be the only source of information and recommended parallel use of observational techniques, because users are not always able to identify all their real needs</td>
</tr>
<tr>
<td>Jordan (1994)</td>
<td>Human factors (interface of library system)</td>
<td>Used focus groups parallel to think-aloud protocols and a subjective usability index</td>
</tr>
<tr>
<td>Hone et al. (1998)</td>
<td>Human factors (suitability of speech technology for Automated teller machines)</td>
<td>Conducted a large-scale study incorporating three complementary methods: survey, focus groups, and user trials utilising a prototype incorporated video simulations into focus groups</td>
</tr>
<tr>
<td>Wilson and Callaghan (1994)</td>
<td>Human factors (hand held computer systems)</td>
<td>The contents of the focus group sessions were based on the study of ergonomics guidelines in related fields and expert interviews; together with contextual field research to understand user tasks, focus groups provided the basis for tests on specific aspects (e.g. product handling, form perception, readability) Use of scenario techniques</td>
</tr>
<tr>
<td>Porter (1993)</td>
<td>Market research (prototype evaluation)</td>
<td>Focus groups to assess the project terrain, to evaluate early product specifications and provide a 'reality check' for designers; data may be used to design questionnaires</td>
</tr>
<tr>
<td>Zarean et al. (1994)</td>
<td>Market research (requirements specification)</td>
<td>Quantified the data from focus groups through national telephone surveys</td>
</tr>
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### Table 1 (continued)

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<tr>
<th>Source (authors)</th>
<th>Field of application</th>
<th>Details of application</th>
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</thead>
<tbody>
<tr>
<td>Savage et al. (1995)</td>
<td>Market research (requirements specification)</td>
<td>Used the results to re-examine competitive product analyses and devise competitive trials for concept designs. Included questionnaires and presentations of product concepts; used scenario techniques to understand the different modes of use for new products.</td>
</tr>
<tr>
<td>O'Donell et al. (1991)</td>
<td>Human factors (interface evaluation)</td>
<td>Used focus groups as an evaluation technique for a central heating controller, using software simulation.</td>
</tr>
<tr>
<td>MERCI (1997)</td>
<td>Human factors (interface evaluation)</td>
<td>The new system (interface solution) was kept running on a large screen throughout the session to offer inspiration and provide a memory aid.</td>
</tr>
<tr>
<td>Caplan (1990)</td>
<td>Human factors (photocopier development)</td>
<td>Developed focus groups to extend the qualitative results with quantitative data—to expand the applicability of focus groups beyond the stages of early exploration; included performance testing sessions of prototypes with individual participants one or two weeks before conducting focus groups; the group session was expanded with a ‘decision making analysis’—to establish performance criteria during the session, and rate the criteria—as a basis for ergonomic experts to rate each concept.</td>
</tr>
<tr>
<td>Sato and Salvador (1999)</td>
<td>Human factors (software/interface design)</td>
<td>Modification of focus groups to sessions termed ‘focus troupes’—either by letting participants act out scenarios or by letting audiences observe actors demonstrating scenarios of use. These may follow by structured conversations to comment on the concept; beneficial to create a shared context of use; can be used to deal with the challenge of developing and evaluating a new product for which there is no experience of use—because in this case there is a lack of knowledgeable users.</td>
</tr>
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</table>
The efforts required in validating the results through involving larger numbers of participants or a variety of studies depend on the purpose of the study. Design research is often limited by time as a resource. Its main objective is to create communication with users and to directly inform the designing process—without claiming to be comprehensive. Ideally, the research incorporates human factor researchers and market researchers from early in the process, working in close collaboration with designers and users.

User-centred design methods differ by the degree of user participation and the amount of control given to users in the decision-making process. Carmel et al. (1993) distinguish three levels of user integration for group-based sessions:

1. **Consultative design** – users are incorporated primarily as sources of design information.
2. **Representative design** – selected user representatives take part in design decisions.
3. **Consensus design** – responsibility for the development is assigned to the users.

Leonard and Rayport (1997) suggest an alternative to traditional market research methods, such as focus groups, called 'empathic design'—based on the finding that members of discussion groups can only report needs they are consciously aware of. They argue that true innovation can only stem from observing people using products in the context of a natural setting, such as the home environment. However, this type of research can be time consuming. Focus groups provide an efficient method for revealing issues, users perceive as important. Observational techniques are a valuable addition to focus group research. Rayner (1997) reports that traditional market research techniques, such as

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**Table 1 (continued)**

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<thead>
<tr>
<th>Source (authors)</th>
<th>Field of application</th>
<th>Details of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolan et al. (1995)</td>
<td>Human factors (development of electronic handsets)</td>
<td>Extended focus groups through creative activities (e.g. drawing and clay for modelling) that inform designers about needs that are more difficult to express in words</td>
</tr>
<tr>
<td>Burns and Evans (2000)</td>
<td>Design research (car design)</td>
<td>Engineer/customer workshops where design engineers work directly with customers to generate solution ideas; focus groups and participatory user workshops provided the main design research tools besides observational techniques; use of scenario techniques to understand the different modes of use for new products</td>
</tr>
<tr>
<td>Fabius and Buur (2000)</td>
<td>Design research (re-design of a commercially used electrical device)</td>
<td>Participatory workshops involved 3 designers and 2 usability specialists in an open-ended discussion and were held both at the workplace of the users and in a usability lab; they were analysed collaboratively by usability specialists and designers, where pre-selected video clips were represented by cards with pictures</td>
</tr>
</tbody>
</table>
focus groups, are suitable to complement empathic design methods.

3. Case study 1: interviews with practising designers

3.1. The intuitive designing process

It is difficult for designers to describe their own designing process—partly because it varies from project to project, but mainly because intuitive processes are difficult to articulate and analyse, as they happen largely unconsciously. It is difficult to predict how and when the ideas and solutions occur. The following comments highlight the individual views of the designing process:

It is difficult to understand/conceptualise your own designing process...it's got something to do with the information you 'suck in', the individual's scars of live, the daily experience...you tempt yourself with resources you enjoy and bits you play with...it's intuitive...it happens but it's out of our control. Ideas just come up, from looking at existing products...and combining them with your experiences.

The process is ever-evolving; it evolves with you...I am not sure how to apply focus groups to this intuitive learning process...it's all so close together.

Design processes vary substantially between different design areas, product types (complex area or more focused targets), design tasks (incremental change or 'blue-sky'), and individual approaches due to experience and training. The approach an individual designer may take to a design task may vary significantly from designer to designer. Although a large number of formalised techniques and systematic approaches are available, they are rarely applied as such. Formal methods such as QFD [quality function deployment] are too 'artificial'...designers are aware of the issues but don't tend to work through them in a systematic way. When formal methods are part of the training of designers, then they adjust them to their needs: ...you tend to put your own edge to it, by...trying and combining the information as necessary with that project...there would be certain elements you'd use. The methods are used in an intuitive and iterative manner (...touch and feel your way through), often driven by time constraints.

3.2. Practical constraints

Designers find it difficult to dedicate time to conduct additional user research, particularly freelance designers, and perceive that they might 'lose out' when spending extra time on user research:

...most market analysis is carried out by the client company, all the testing is done externally, most of what I do is hands-on design work...I generally have to put a price against the brief. If my client comes to me and I don't know the answer...then he'll go to somebody who does...he'll say 'just get on with the design work'...the designer is expected to know.

[focus groups] detract too much from the designing activity.

Freelance and contract designers emphasised that the opportunities for conducting design research often depend on the client. Designers are under pressure to respond rapidly to design briefs and generate initial concepts. Only occasionally, there is scope to involve users at the later stages of the project:

People are very conservative, you have to be quite careful about picking your terms.

The clients' perception is that the designer will draw it—by the end of the afternoon he [sic] should have something, that's a common perception. They still think black and white drawing is going to be cheaper...they want something they can keep and show it to people.

Sometimes clients are knowledgeable about the market and have pre-determined what they are looking for. They may insist on their perceptions, although the clients' market research is frequently based on sales figures. Designers observed that perceptions about the need for user research are changing—reporting that designing now tends to be more market driven and that user research is being emphasised more strongly.

In-house designers do not depend on clients' perceptions and contracts and tend to be able to dedicate more time to considering the user. They draw largely on input from market research departments or ergonomics guidelines.

3.3. Designers' role; perceived limitations of users

Designers perceived various drawbacks when eliciting needs from users:

Users don't always know what they want.

It is more likely that you get an answer based on what they already know, based on what new technology is already available, or what is just coming up...Their thinking is very conservative.

Users will often not be able to talk about it or don't realise they use a product in a certain way...
Several designers were concerned that the success of the research is limited by the restricted ability of users to be creative and innovative:

I don't think that is a good creative process...it may depend on whether these people have creativity and imagination.

Designers are expected to design for the future, users tend to only consider what they have experience with. It may be difficult for people to get out of their usual mode into a different dimension...how long does it take for an individual to become relaxed.

...their input may be limited because they are not being part of the whole process.

Designers were worried about how their image is being perceived:

...as a professional...if you go and ask the public what to design you are not flowing, you are following culture rather than shifting.

It is not a good idea to spend lots of time to convince a client that I am a good designer, and then to start asking for money to do user research to generate novel ideas.

There were concerns about how the additional task of carrying out user research would change the role of designers:

Using the method to generate new designs may be constraining...you end up doing what other people have in their imaginations...it's up to the designer to push a bit further.

[When users are given brainstorming tasks] ...what would then be the role of the designer—creator or mediator

I would have to give up something else for it, designers would not be designers anymore.

3.4. Lack of skill and knowledge

Although several designers had some limited experience of focus groups, their lack of understanding of what is involved and the potential benefits was evident. There seemed to be a perception, based on designers' experiences, that focus groups are mainly used to evaluate concepts.

There was concern about the absence of skill to be able to prepare and conduct focus groups. There was a lack of confidence in developing questions to ask. I need to know about writing questions to get meaningful answers. Having observed a session, one of the in-house designers commented that ...some of the questions were too open, others too close...it is necessary to tease the individual to understand their real views. Designers require moderator training. ...it needs to be done properly and professionally.; I think a trained moderator would probably do the job better.

There was a resistance to changing the current working practices. “Designers have gone into using a method through an evolutionary process...the use of new techniques may require to be linked more into education...designers would require ‘brainwashing’”. Moreover, the concern was raised that there are already many training requirements for designers.

Some designers expressed that they would be happy to try focus-group techniques after appropriate training:

If the designer is going to use it to improve designing, than a very strong designer might want to be part of that...I would be happy to try it with some training.

It might be useful, I might be willing to try it at certain clients at certain times.

3.5. Designers' information needs

Designers often experience a lack of information about user needs. In situations where designers can become involved in user research, it is often based on observation and/or studying existing material (e.g. evaluation of prototypes or mock-ups by users and/or clients). When designers had an opportunity to understand more about the user tasks and the user environment, then they valued that information. Some designers were confident that focus groups could provide useful information. Often they tended to envisage a situation of product evaluation. Freelance designers perceived focus groups to be useful if the client was market-led and wanted to respond to everything that their customers wanted. The in-house designers had already observed a focus group, but were sceptical about how to use the information from this particular session.

Designers emphasised the importance of ensuring that research retrieves valuable information efficiently. The objectives have to be clearly defined. The reasons for conducting the research and the resources available need to be made clear. It is vital to retrieve information that is important specifically to designing. There was a concern that, without careful preparation, the research may retrieve an abundance of information. It is important to discuss real issues in relation to the designers' task, which is often to make products identifiable and distinct to others.

All the designers interviewed, expressed that user information is important:

Cost and manufacturing...that's the pressures that I get most of, I don't get enough seeing what people need, what people want, that's much more difficult to get at...that would certainly be very useful, lots of it is guesswork, intuition, and feel.
I'm not that aware of the end user, neither are my clients, because when I ask and I always do because I like to get a picture in my mind about what this person does, I get a different answer from every one.

The majority of designers receives information about user needs from market research departments or clients, and saw little point duplicating those activities. Information is available without speaking to the customer directly. For some designers, the need for information about user needs depends on the project. For well-known areas it may be the case that designers... know what styling the customer wants. In other circumstances, there may be a wide user group and complex design tasks, where giving the research task to designers would be too demanding, or evaluation of full-scale prototypes too costly. There was a fear that user research could constrain designing in certain situations.

Where designers are provided with user information from market research, there was a clear indication that this information is not adequately presented. In-house designers reported that documentation tends to involve quite detailed, tedious and long-winded documents. Designers tend to prefer the research findings to be presented concisely.

We don't carry out consumer research, we get it from the market research department...we interpret it the best we can.

The marketing specification is often too restrictive, not intuitive enough, the information collected might be irrelevant...

On other occasions the information may be very limited. User research and designing is not always sufficiently integrated. The information does not always suit the creative process of designers. In-house designers observed that designing is closely related to cultural aspects. It is easy to get sucked into details...the wider issues...the cultural issues are more important, such as 'why does the kettle exist', why is it used...It is useful to consider the history of objects. Designers need to consider peoples' lifestyle, and need to be continually aware of trends, ideas and fashion. One of the designers emphasised the need to understand user characteristics beyond the generalising term 'customer'.

The type of data required depends on the particular was found to be helpful to know more about different possible situations of use.

The opportunity for informal discussion with users was considered helpful to designers. It was observed that it might be useful to bring in techniques beyond the discussion activities. Observation techniques were recognised as useful, especially when expert users are involved.

3.6. Designers' involvement

Some designers view user research as a skill that does not suit the characteristics of designers: Focus groups should be a specialised input by a qualified practitioner. Two of the designers, however, stated that they had no reservations about directly interacting with users. One of them expressed a preference for talking to people, rather than receiving the information from a marketing department. Three of the designers felt in some way uncomfortable about talking to users directly. Their concerns were:

The presence of the designer may be problematic in a heated, emotional discussion about design concepts...how to deal with personal 'attacks' of the users...this may require the presence of an impartial moderator to be the 'referee'.

Designers tend to fall in love with what they have done, hence, they may be the wrong people to take part in evaluative sessions.

I'd prefer discussion groups...with people of similar beliefs, where you have a common ground. I would feel more comfortable if I was asking people whom I trusted than asking strangers, they got opinions, but everybody has.

I'd rather not directly interact with the users...I'd like to just observe interaction... designers are essentially good with 'things', other people are good with 'people'...those who are good with things just see how it is, solve it, and make things. People who are good with 'people' talk about things and analyse things—there is a distinction.

The in-house designers observed that focus groups would be useful to understand user needs earlier, before the designing process commences. It would be important to know early on in the process how the user would
camera—just as the feedback from clients is often judged by their initial reactions. There is some indication that designers would benefit from input into the preparation of the design research:

I always wonder whether they ask the right questions...I would like to have asked some of the questions myself, because you have a feel what precisely you are looking for...I am always suspicious of material that has been gathered and then modified.

It would be valuable to have a say in the preparation of market research for aspects to be included that are valuable for designing.

4. Case study 2: design student feedback

4.1. Experiences and perceptions of user research

The sample of students had been introduced to user research during undergraduate design projects, but had not come into contact with focus-group techniques. They had mainly applied questionnaires and one-to-one interviews. Often they consulted their peers—usually fellow student designers—to examine the design problem or gain feedback on potential solutions.

There were mixed opinions about the usefulness of user research. It was recognised as important and was often conducted, being part of the project requirements, but was perceived by some as a 'hassle' and time consuming. Some students were unsure about the value of the research—as they often found out mainly what they knew already—so the research just tended to confirm their point of view. Others could see clear benefits, had gained vital insights for their designing work, and valued user research as an important part of their activities: I have gained from the experience...when you finish your user research first then the concepts are much better and more focused.

It was seen as important to receive constructive criticism early in the designing process, as it can significantly help to enhance the final design proposals. It was recognised that user research can be integrated within the information search that designers carry out as part of the creative process: Having to prepare a focus group is a way of defining a problem, to keep the project on track, set your boundaries at the beginning and be clear about them...it's part of your research.

There was a concern about the ability of users to contribute to visionary designs, stemming from their perception that users are not creative: Often there is that perception that you should know better than the user, because you are the one who is designing...when you ask the mainstream user about the design of a product then they'll say 'you are the expert, you tell me'...often you have come up already with a few ideas...and there is a mental block there.

Users are quite forgiving and might not always be aware of the problems that they adapt to. Given that new products usually tend to be developed within a very short span of time, it was perceived that it might be difficult to predict with current research what people want 4 or 5 years ahead. There was a "worry is that you don't come up with something new when doing too much research of current perceptions". It was perceived that, some new products are technology-led, often people don't know about the possibilities.

Designing was perceived as the ability to 'create' user needs through novel shapes, functions and technology. Designers considered themselves as 'trendsetters'. Many of the designers perceived a conflict between being innovative and asking users about their needs. They are under constant pressure to generate innovative ideas and may feel that users may hold them back. However, it was recognised that designers have difficulties in acknowledging that users can provide valuable information. It was seen as important that focus groups provide information about aspirations beyond the functional.

4.2. The benefits of focus group research

The student designers recognised users as a valuable design resource. They identified opportunities arising from user research in providing evidence on which to base design decision-making. The opportunity to share ideas with users was perceived as valuable in supporting concept generation. Early involvement of users was recognised as important. Users may be more suitable to pick up on potential flaws regarding the operation of product concepts, as they provide a different angle to viewing the product use.

The group interaction (the synergy) was appreciated as being potentially useful to stimulate thoughts through sharing and comparing of examples and mutual stimulation. It was recognised that users appreciate the opportunity for discussion, above questionnaire form filling. Group discussion was viewed as providing more valuable data, whilst form filling is not as careful and considered...it is important to sit people down and spent some time and focus on the topic. Questionnaires had been experienced as limiting: For my project I have spent hours designing a questionnaire and it was so difficult to get adequate responses...it is so much easier just talking to people...most of the information I eventually used for the project came from conversations.

The semi-formal setting of a focus-group session was viewed as beneficial. Involving users within a relatively long session (e.g. 3h) with a pre-determined structure allows the use of a series of exercises and visual aids. The
opportunity to share experiences can lead to a deeper immersion into the design problem. Likewise, a friendly and informal environment increases the confidence of both participants and designer-moderators, and encourages a creative atmosphere.

4.3. Practical aspects

The opportunity to observe user communication directly was welcomed, as the tone of voice, facial and body expressions are useful cues, whilst written notes are often more difficult to understand. All students welcomed an opportunity to directly observe focus-group sessions and take part actively through co-moderating. They were uncomfortable with being solely responsible for moderating sessions. They feared that they would have to concentrate far too much on thinking of the next questions and keeping the momentum of the conversation going, rather than making use of being present in the session.

The students were also concerned that they might sub-consciously try to influence what the users are saying, because designers may be overly focused on the project. However, the opportunity to ask additional questions during the discussion was welcomed, particularly as new questions may be triggered during the session.

The majority of the student designers highlighted their lack of skill and experience in formulating questions. It was recognised that asking users about 'needs' is difficult—they have to be uncovered and elicited skillfully. Designers would need support in generating the questions at the right level of detail, in ensuring one question leads to another, to avoid influencing users' views, whilst gaining useful information, and encouraging users to be creative. It was identified that it is important to encourage users to express their honest opinions when evaluating design concepts in the presence of designers, as users might hold back too much to please designers.

The student designers displayed a preference for generating data that provides insight into product aesthetics and semantics. They suggested the use of mood boards, which is a collection of abstract images to represent an emotional response to a product, problem, or user (Garner and McDonagh-Philp, 2001). A list of positive and negative evaluative adjectives based on user evaluation of existing products, which had been introduced as an example of how to analyse and present data, was perceived as particularly useful.

The time-consuming nature of the techniques was considered problematic. It may be difficult to know when to stop researching. There may be a problem with trying to evaluate products outside the context of their typical user environment. Being able to select suitable samples of users to obtain a representative view and extract valuable information from a variety of opinions caused concern.

Conducting focus-group research requires training as well as practice to become more confident. Given the benefits, several students stated that they would be prepared to make the effort.

5. Discussion and conclusions

To suit the needs of designing processes, user-research techniques:

- should be suitable for use during all stages of the designing process, as well as prior to concept generation;
- need to adjust flexibly to the varying requirements of design processes and should only include a basic level of formality;
- need to provide data to suit designers, such as visual material information that inspires rather than feels restrictive;
- need to enable designers to involve users in suitable exercises, retrieve needs beyond the functional, and to 'unlock' users' creativity.

Designers confirmed that knowledge of user needs and aspirations is valuable for their designing processes. The additional effort spent on user research may be worthwhile. Designers (as well as clients and manufacturers) need to understand that consulting users directly is not a way to take away the task of designing from designers, but to enhance their designing process through deep immersion into the user experiences, aspirations, and dreams. Users' creativity can be encouraged through a variety of exercises. The 'needs' retrieved from users require 'translation' into designs. Users help to formulate the problem, but do not necessarily provide solutions. This is still the designers' task. Focus group techniques suit designing as they:

- provide an efficient technique to gain a diverse range of insights about user needs and aspirations that may be particularly suitable for designers—as a variety of user-research techniques can be incorporated into a research session, thus providing a rich source of inspiration for designers (Bruseberg and McDonagh-Philp, 2001);
- can be applied to a small-scale study and still be useful, due to the opportunities for communication with users and the qualitative character of the data;
- aid participants in articulating their needs through the group interaction (synergy).

Design work is often carried out in a design team. By applying focus-group techniques, users can be made as a part of this team. Moreover, discussion sessions with users may be suitable to link together different professionals, such as ergonomists and designers. They aid and
encourage collaboration through joint user-research activities. This also enhances designers’ communication skills.

Designers need to receive appropriate training. Undergraduate degree programmes have not, until recently, integrated research methods during design training. The industrial design and technology programme at Loughborough University is integrating user research from the first year of undergraduate training onwards. Moreover, the studies presented here have been instrumental to the development of guide material for designers by the authors. It aids designers as well as design researchers in conducting user research based on focus-group techniques as an integral part of the designing process.

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CHAPTER 4

Focus Groups in New Product Development: Designers' Perspectives

Anne Bruseberg and Deana McDonagh

4.1 INTRODUCTION

For designers, knowledge of user needs and aspirations is vital for effective design solutions. Incorporation of user needs into designing may lead not only to commercial success, but also, it is hoped, to social gain for the users of the new products (e.g. through more satisfactory products). User-centred design approaches aim to expand the designers' knowledge, understanding and empathy of users.

One of the primary barriers to be overcome by designers is the acceptance that they need to be aware of their own limitations. Their background, training, age and possibly gender may make them distinctive from their target users. This is not to say that a 20-year-old female designer cannot respond to the needs of a 75-year-old male consumer, but to highlight that the boundaries of one's understanding can provide the impetus to seek further understanding through design research. Designers need to widen their empathic horizon through contact with users and exploration of user needs, as visualised in Figure 4.1. By seeking to comprehend aspects such as the lifestyles, cultural values and experiences of the target user group, designers are better equipped to empathise with the needs and aspirations of prospective users.

Design research methods and techniques place designers' own understanding in context, and offer a basis for user-centred designing. Moreover, products do not exist in isolation. They satisfy a number of users' needs beyond the functional. Thus, practising designers benefit from the availability of applying methods and techniques to elicit these often intangible needs during designing. Designers may benefit particularly from the terminology of the users.

Design research, within the discipline of Industrial and Product Design, is an emerging culture that is increasingly integrating methods and techniques from other disciplines (e.g. human factors/ergonomics, social sciences and market research). Conventional design training has, until relatively recently, not incorporated design research methods and techniques within mainstream Industrial and Product Design training programmes. Through a number of case studies (e.g. McDonagh-Philp, 2000), it has been recognised that designers would benefit from the inclusion of design-research methods at undergraduate level. In a study investigating the skill requirements for Industrial Designers, recently graduated practising designers considered themselves as 'poor researchers and would now view researching skills as an important aspect of design education' in relation to their creative problem solving skills (Garner and Duckworth, 1999, p. 94).

Designers need to immerse themselves into the design task specified by the design brief by collating a range of different types of information. Often, designers do not have access to the original primary data collected by market researchers. Through this division of activities, vital details may become lost because results tend to be summarised. Designers possess a relatively unique range of skills, sometimes referred to as their
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‘toolkit’ (e.g. lateral thinking, ability to innovate and visualisation skills). Focus group techniques offer designers an addition to their existing toolkit, by acting as either moderator or observer. Focus group discussions can provide designers with an insight into users’ needs, aspirations and emotional bonds with products.

This chapter explores practising and training designers’ perceptions of focus groups, with particular emphasis on the benefits and drawbacks, and concluding with recommendations for overcoming these barriers. It draws on three case studies.

4.2 DESIGN RESEARCH AS PART OF THE DESIGNING PROCESS

Each design project tends to be unique in nature, due to variables such as the scope of the designing task, personnel available, client, budgets and time constraints. Bearing this in mind, each project will follow a unique process. Designing is not prescriptive. Figure 4.2 illustrates a basic range of techniques utilised during designing.

On receiving a design brief, designers (the design team) will explore an identified problem, product opportunity, user, and use environments, within a context. Through the use of brainstorming and mind mapping, designers are encouraged to suspend reality and think laterally. Such activity helps to generate triggers, novel uses of materials, and hopefully unexplored solutions and possibilities. This stage requires a non-judgmental environment to encourage creativity. A mood board may be created as a direct emotional response to the brief, and often after the initial brainstorming phase. It is a collection of abstract images that offers designers cues to colour, texture and form. Designers can use these images to immerse themselves into the emotions that the future product is hoped to generate in purchasers and users.
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Figure 4.2 The designers' basic toolkit

Brainstorming (mind mapping)

Mood board

Initial concept generation drawings

3D modelling

Appearance models (first generation)
The next stage, **concept generation**, involves exploring form and visualising concepts two-dimensionally. Once a range of concepts has been selected for further **concept development and refinement**, three-dimensional models are generated. This enables a more thorough evaluation of the concepts by users. Appearance models are produced throughout the designing process to create an almost realistic concept proposal for evaluation.

Figure 4.3 visualises how designing activities (shown on the left) may be combined with user research activities during the concept designing stages. At the beginning of a project, it is beneficial to concentrate on eliciting user perceptions, experiences and wishes. More attention may be paid to aspects such as user lifestyles, dreams, user tasks, user environments, situations of product use, user experiences, the evaluation of existing products, and/or the use of materials. The activities should aim to increase the understanding of user needs beyond the functional (e.g. product styling). It is useful to 'step back' and consider the entire product context (e.g. user tasks and environments of product use). This may reveal needs that have not yet been identified. Users may be invited to brainstorm about ideal product solutions, either verbally or through creative activities, such as drawing or modelling exercises. Since focus groups retrieve qualitative data, they are particularly suited to these functions.

After the initial concepts have been generated, user responses may be sought to assist the selection of concepts for development and further refinement. Concept evaluation by users may involve the assessment of ideas, drawings, models and prototypes. It is helpful to select a diverse range of concepts (ranging from incremental changes to existing forms through to more abstract, blue-sky proposals) to be presented to users and to provoke responses. Early concept evaluation sessions may still focus on further idea generation. They aim at retrieving feedback from users on the designers' perception and understanding of user needs. The concepts enable further exploration of users' wishes and can be used to inspire users' brainstorming.
In practice, manufacturing companies tend to involve users at the concept evaluation phase at the end of the concept designing stage. Focus group research is able to provide a substantial knowledge base about user needs and aspirations before designing activities commence. This approach helps to avoid design fixations (Jansson and Smith, 1991). If designers begin concept generation prior to being immersed in the user experience, they tend to invest heavily in the early concept work. Later research findings may indicate a need for a change in direction. Due to this early investment, designers may become resistant to alternative avenues of exploration. Once concept generation has began, the research and designing process should continually inform each other in an iterative manner (see Figure 4.3). As there is only little scope for comparison between sessions, the contents of the sessions may be varied according to knowledge gained previously.

The level of involvement of designers during the research activities may vary depending on the time, resources, personnel and the budget available. The authors envisage three different scenarios for the level of responsibility that designers may have in conducting the user research:

Scenario A: designers carry out all the associated activities;
Scenario B: designers delegate administrative and organisational tasks;
Scenario C: designers are only partly, but actively, involved (e.g. preparation of session contents, co-moderating) and collaborate closely with design researchers.

4.3 DESIGNERS' PERSPECTIVES

4.3.1 Three Case Studies

Two studies with five design practitioners and seven undergraduate design students have been conducted to explore designers' perspectives of focus group techniques. The practising designers' ages ranged from 22-52 years and included two freelance designers, one working for a design consultancy and two working as in-house designers for a manufacturer of consumer products (see also Bruseberg and McDonagh-Philp, 2000). During one-to-one interviews, the designers provided feedback and comments on the appropriateness of focus group techniques in relation to their own needs and designing processes.

The students' ages ranged from 20-22 years, and were a mix of second year students and finalists on the Industrial Design and Technology degree programme at Loughborough University. The majority of them had recently returned from industrial placements. The students' feedback was retrieved in the setting of a focus group after being given a detailed presentation with drawbacks, benefits of focus groups, practical requirements, and the various techniques that may be integrated (refer to Chapter 2, Table 2.1).

The third case study involved a practice-based design-research project. A range of user research techniques based on focus groups was applied during a design project for small domestic kitchen appliances. The authors worked as the design researchers in close collaboration with a consultant designer, who provided valuable feedback regarding the techniques used, the information provided, and the design team collaboration during a one-to-one interview.
The findings presented here do not aim to show evidence for general designers' thinking, but show the perceptions of the designers interviewed in this study, thus representing a sample point of view. Moreover, they are summarised here to give a brief overview, rather than explore the issues in depth. Further detail can be found in Bruseberg and McDonagh-Philp (2002).

4.3.2 Practitioners

Previous experience

Although the designers had a basic understanding of focus group activities, none had been involved in focus group research. Two designers from the manufacturing company had once observed a focus group session, which had been organised by a professional moderator. For most designers, focus group data were a rare source of information. If there had been contact with focus groups, then it was usually in relation to market research.

Focus groups and the designing process

Designers stressed that designing is a flexible process that draws on a large amount of information and the designers' experiences. It is an intuitive, unpredictable and continuous process. Designers find it difficult to conceptualise their own designing process and can rarely explain what really drives ideas to occur. Designing draws from a large variety of resources.

The methods used vary considerably because of the differences in design areas as well as project circumstances, but also because of individual differences between designers. Every designer adapts a set of techniques based on training and experience to suit personal preferences as well as the circumstances of the designing task.

Designers rarely apply formal approaches or systematic methods as suggested by the design literature - partly due to time constraints, but also because the methods need to be flexible. Formal methods are considered to be artificial and have not necessarily proven to be beneficial.

Designers' reservations towards focus group activities

Freelance designers anticipated particular difficulties with finding the time to carry out user research themselves, particularly as clients are not prepared to pay for such activities. Designers are often not in control of which or how user research is to be carried out. Some of the designers perceived that there is a gradual shift in the design and manufacturing culture towards the acceptance of more user research.

Focus groups may detract designers too much from actual designing activities. A common perception by both designers and clients is that the function of the designer is to produce quick sketches, rather than examining the design problem in depth.

Consulting users was perceived as a 'weakness', as designers are expected to 'shift culture' and create innovative solutions. There was resentment towards the prospect of changing the role of the designer when incorporating a number of new roles, such as moderating or communicating with users directly.

Some designers displayed a resistance to interacting directly with users. Designers sometimes expressed concerns about conflicts of opinion with users, or lack of 'similar beliefs', particularly when being present in a concept evaluation session. There was a
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Concern that users may not know their own needs or aspirations, or may not be able to articulate them. Designers doubted that users would be able to think creatively, both due to lack of training, but also because they cannot immerse themselves into the design task as deeply as the designers are able to.

The lack of understanding of focus group research and the potential benefits was evident. There seemed to be a perception from experience that focus groups are mainly used to evaluate concepts. There was concern about the lack of skills available to prepare and conduct focus groups, including being able to ask appropriate questions.

Designers' views on benefits from being involved in user research

The consideration of the users' tasks and the user characteristics is instrumental to designers. Whilst some designers displayed some resistance to changing their working patterns, others were more receptive provided they were given a supportive environment. Some designers stressed the importance of carrying out user research prior to concept generation; others saw more benefits in evaluating early concepts. Designers emphasised that the objectives need to be defined clearly. The outcomes should be well tailored to the information needs of designers regarding users' aspirations and needs.

User research and designing is not always sufficiently integrated. The information received from market research departments is often perceived to be unsuitable because it does not aid the creative process or may be perceived as restrictive. The presentation of the information in a summarised form and through written documentation is often resisted. Several designers expressed that they would value input into the planning of user research.

Information about user experiences, user tasks, problems, user values, and user perceptions was considered as particularly important. Cultural issues, including insights into people's lifestyles or 'what a product stands for', were considered to be of particular value for designing. Brainstorming activities with users about the 'the history of objects', as well as product trends, were regarded as beneficial exercises. Beyond that, discussing initial design ideas with users was seen as useful. Designers advocated the incorporation of techniques that provide visual information, such as observational techniques. A friendly atmosphere to support such collaboration was considered crucial.

4.3.3 Undergraduate Feedback

Students were open towards user-centred design approaches. They had mainly used questionnaire and/or interview techniques to research user needs during their degree course projects. Some students had positive experiences from involving users into their designing process during the requirements capture stage, and were receptive to spending a considerable amount of time on user research. Investigating and empathising with user needs was seen as part of the preparation for creative problem-solving. Others had encountered difficulties (e.g. time available, usefulness of information gained, lack of user co-operation) and were unsure about the benefits.

Some students had encountered a conflict between being truly innovative and drawing on users' perceptions that they regarded as restricting their creative freedom, or being 'out of date'. On the other hand, students recognised that users often have unarticulated wishes and may be particularly suitable to provide unbiased, critical feedback to design concepts. Communication with other people (e.g. non-designer friends, colleagues, users) about user needs and concept ideas was perceived as an important tool to examine the design task and stimulate the mind. Moreover, designers
often find themselves in a situation where they have to defend their solutions to clients—therefore the availability of evidence from user research was seen as beneficial.

Students welcomed the semi-formal nature of focus group activities. A basic degree of formality provides a neutral environment where honest input is encouraged and sensitive issues may be tackled. At the same time, a friendly and informal atmosphere puts everybody at ease, promotes user co-operation, and supports creative activities. The group synergy (i.e. the sharing and comparing of ideas and experiences amongst group members) was recognised as valuable for retrieving useful information.

Students emphasised the need for support in formulating appropriate questions—to retrieve the required insights, promote discussion, avoid bias, and lead skilfully from one question to another. The incorporation of a variety of techniques (e.g. questionnaires, product handling and product personality profiles) besides the actual discussion was welcomed. Insights into emotional and aesthetic values were seen as important.

Students were not confident about the prospect of moderating group sessions themselves, even with training, but welcomed the opportunity to co-moderate sessions and actively take part. The time required for the analysis of qualitative data was perceived as problematic. Regarding data presentation formats, preferences were expressed towards visual information and overviews of users' values.

4.3.4 Consultant Designer Feedback on the Design Research Project

The consultant designer preferred user research involvement from the earliest stages, including preparing the research and collecting relevant material (e.g. future trends, history of products). The presence of designers during the sessions was seen as vital. Particularly during the stages of concept evaluation, active involvement of the designer was regarded as essential, such as introducing the concepts, leading the concept evaluation discussion, and responding to participants' questions. The designer benefited from previous experience in leading a group discussion—to be able to deal with situations where users are not sufficiently communicative, and to make sure all participants provide input.

Owing to the time constraints of the project, the data analysis was largely carried out by the design researcher/ergonomist. The designer valued a summarised presentation showing categories of user values, preferably in the shape of a bullet point list, but supported by a range of examples (e.g. users' quotes or selected video clips). A list containing positive and negative adjectives for selected products, taken from user product evaluations, was particularly appreciated. These provided an overview of how users perceived the styling of a number of sample products (see Chapter 2, Figure 2.18). The availability of a range of different types of data from a focus group session was perceived as useful. Besides the direct verbal feedback on early concept drawings, the designer particularly valued opportunities to observe user interaction with products, and users' expressions through drawings.

The designer appreciated being able to concentrate on studying information, preparing their input into the concept evaluation sessions, and generating/developing concepts, as all organisational activities were carried out by the researchers—such as recruiting participants, scheduling the sessions, conducting the session. The designer regarded the regular consultations with the design team as essential—to set out issues for the next focus group sessions, discuss the design concepts, review whether the concepts met user requirements, and to decide on the selection of concepts to be taken further.
4.4 CONCLUSIONS

Whilst focus group techniques have a number of limitations, several of the reservations from designers stem from preconceptions based on the lack of knowledge about the potential benefits, and from previous unfavourable experiences. Other reservations are based on practical restrictions and constraints, often due to external circumstances, such as lack of time or client attitude.

The authors believe that users need to be recognised as an indispensable design resource, as the merits of their input are often undervalued. It needs to be appreciated that the immersion into user aspirations from early on in the designing process is vital to successful product designing. Designers' comments have confirmed that considering the user is central to all design tasks. There are signs that the benefits of user-centred designing are becoming more accepted by designers, clients, and manufacturers.

Focus group techniques need to be adapted to the specific requirements of designers and creative design processes. The information provided from market research departments and/or ergonomists is often inappropriate for designers, or may be perceived as restrictive. The techniques need to take account of (a) the working environment/conditions of designing, (b) the information requirements of designers, and (c) the needs for interdisciplinary collaboration. Design research techniques are intended to build on designers' current skills and expertise, rather than transforming designers into ergonomists or market researchers.

Designers often resist formalised approaches. Focus group research provides a basic structure to the elicitation of user needs, but also provides an adaptable method that includes a high level of informality. Conducting focus group research may thus be particularly suitable for integration into the information search that is part of designers' creative phases. Moreover, focus group techniques are useful to aid collaboration between different professionals (Bruseberg and McDonagh-Philp, 2001).

Design research is a relatively recent development within the design discipline. For practising designers this paradigm shift becomes challenging, for the student designer the design research culture is introduced earlier and more gradually. Due to the responsive nature of Industrial Design training at Loughborough University, user-centred design techniques and methods are being integrated within the undergraduate programmes. This shift in emphasis has enabled a generation of up-and-coming designers who possess the skills and expertise on graduating to implement, adopt and employ techniques, such as focus group activities, as part of their enhanced toolkit.

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CHAPTER 2

Organising and Conducting a Focus Group: The Logistics

Anne Bruseberg and Deana McDonagh

2.1 INTRODUCTION

This chapter will discuss and highlight the activities necessary to gain the most from focus group technique. Much of the procedural literature available to support the application of focus groups is tailored for social scientists and market researchers (e.g. guidebooks by Morgan (1998a, 1998b), Krueger (1988, 1998a, 1998b, 1998c), Krueger and King (1998), Greenbaum (1998)). This material is valuable and the authors have drawn on it to a large extent. However, it does not provide detailed suggestions for how focus groups can be used for applications within new product development and human factors/ergonomics. Within these areas, the focus group discussion may be combined with a range of other techniques, or may have to be adapted to suit specific purposes. The recommendations given here build on existing material, as well as experience in developing design research methods.

This chapter provides an overview of the activities that have to be considered when using focus groups. It provides a brief practical guide to support the reader in preparing, conducting and analysing data from focus group activities. The chapter gives practical advice and example illustrations on key activities involved in focus group research, including:

- the characteristics of focus groups;
- planning the research (e.g. specifying objectives, user group, costs);
- recruiting participants (e.g. contacting users, organising sessions);
- specifying the contents of the sessions (i.e. determining the structure of the sessions, the activities involved, the questions to be asked, visual aids to be used);
- setting up the sessions (e.g. room layout, payment arrangements, refreshments);
- moderating/conducting the sessions (i.e. guiding the sessions through the selected topics);
- data analysis (i.e. organising, categorising and summarising the results).

There is no such thing as a generic focus group methodology – the technique needs to be adapted to particular project aims. It is not possible to provide suggestions here for the diversity of potential applications. The most common applications may be user requirements analysis for new product development, or concept evaluation. The scope of applications, however, is very broad due to the flexibility of the technique. This chapter illustrates the main activities, with details and examples from its application to the user-centred designing process for small domestic kitchen appliances. The material provided is intended to be used as recommendations and 'food for thought', rather than a set of prescriptive rules.
2.2 WHAT ARE FOCUS GROUPS?

Focus groups are group interviews, and involve gathering together people with knowledge about a specific topic or issue (e.g. target users) for a relatively informal discussion. A chairperson or moderator promotes the discussion amongst the group, whilst carefully ensuring not to direct, but guide the group through the issues of importance to them. The synergy between the participants (the interaction amongst the individuals based on a mutual interest) assists in uncovering or highlighting less tangible issues. This provides an opportunity to increase understanding, awareness and empathy with group of participants interviewed (see Figure 2.1).

![Figure 2.1 Focus group discussion](image)

Focus groups provide qualitative data. The content of the discussion might take unexpected directions or open up new topics. Whilst the technique provides a high degree of flexibility in the way questions are asked, answers vary and standardisation of the data is not the focus of the research. The data provide detailed insights into people’s beliefs and experiences, rather than statistically secured facts (Morgan, 1998a).

Focus groups encourage communication and provide insight into how others think and talk. They supply an efficient way of gaining an overview over various opinions at a reasonable level of detail. They provide large amounts of concentrated, well-targeted, and pre-filtered data in a short period of time. Focus groups should be used for topics that are poorly understood, because the discussion between people provides a variety of useful data. For example, focus groups provide reasons for individual opinions, and experiences. The technique is therefore ideal for early, exploratory design stages (Morgan, 1998a). For example, focus groups might uncover disregarded product functions, problems of the daily use of existing products in a range of environments, current characteristics in cultural perceptions about style and fashion, or background stories that help to visualise the users’ activities and needs. The technique also offers immediate feedback for researchers, as presence during the session provides a basic idea of the main underlying messages.

Focus groups can be used to investigate complex behaviour and motivations, and to uncover subconscious notions. Through discussion, participants become more explicit about their needs. Likewise, the technique is suitable to retrieve data that are not readily formulated or knowledge not thought out in detail (Morgan, 1998a). This may be useful, as users are not always aware of all the aspects regarding the use of products, or their own preferences.
2.3 FOCUS GROUPS AS A BASE METHOD INCORPORATING A RANGE OF TECHNIQUES

Focus group activities can function both as a technique - enabling group discussion, in the traditional sense - as well as a method - being used in a broader sense to incorporate a variety of other techniques. For new product development, group discussion may provide an overall structure to research sessions, but also incorporate activities such as visual product evaluation, product handling, or drawing. Tables 2.1a and 2.1b give an overview of a range of activities and techniques that may be incorporated within a user research session. As each design brief tends to be unique in nature, the design team will need to assess the existing knowledge, experience and understanding of the team in relation to the investigation and select the most appropriate activities and techniques. Other applications may warrant a different set of techniques (Chapter 12 provides a wider range of these).

Table 2.1a Methods of feedback capture that may be used within the scope of a focus group session
(for new product development)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus group discussion</td>
<td>Discursive interaction between participants (e.g. a sample of users), guided by a facilitator (moderator), focusing upon particular issues</td>
<td>Focused data, revealing experiences and reasons for behaviour, can be elicited in a short period of time; Helps researchers to become immersed in the user's 'world of thought' and terminology; Flexible technique</td>
<td>Relatively high cost (e.g. recruitment administration, participant fees, data analysis); Qualitative data from conversations are difficult to formalise or use as statistically secure evidence</td>
</tr>
<tr>
<td>Questionnaires (Forms)</td>
<td>Retrieving feedback through use of forms with pre-determined questions (e.g. using prepared feedback boxes, rating scales and opportunities for comments)</td>
<td>Feedback is short and precise as comments are restricted; Tick boxes can be analysed statistically</td>
<td>Limited level of detail and flexibility of responses; Statistical analysis may be unsuitable due to small sample sizes; People often prefer talking to writing</td>
</tr>
<tr>
<td>Observation of activities</td>
<td>Watching (recording) users completing tasks or handling products</td>
<td>Retrieving visual information regarding the way the product is used, the features/aspects of use that are of importance to users, and emotional reactions to objects</td>
<td>The artefacts to be handled need to be available; Interpretation may be subjective; Users may dislike being observed</td>
</tr>
<tr>
<td>Creative participant activities</td>
<td>Asking participants to complete creative exercises; may be paper-based (e.g. drawing), through 3D media, or oral communication</td>
<td>Participants are actively involved and produce a tangible output (e.g. wish list); Users may express their wishes and aspirations more freely</td>
<td>Participants may be reluctant to carry out such exercises (e.g. not confident)</td>
</tr>
</tbody>
</table>
Table 2.1b Selected user activities that may be combined with focus groups for new product development (key: feedback capture possible through D: discussion, Q: questionnaire, O: observation, C: creative activity)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Evaluation</td>
<td>Assessing products visually based on an image only; simulating mail order/Internet purchasing conditions (see 12.4.2)</td>
<td>Understanding the perceptions of users on product semantics, based on product appearance only</td>
<td>Limited information available, errors possible due to restricted image quality</td>
</tr>
<tr>
<td>Product Handling</td>
<td>Physical examination of products without actually using them; simulating retail showroom scenario, asking for rapid 'gut reactions' (see 12.4.3)</td>
<td>Retrieving rich user feedback on products in a short amount of time; Requires limited effort</td>
<td>Lack of insight into problems encountered through actual product use; Lack of natural user environment (e.g. the kitchen of a user)</td>
</tr>
<tr>
<td>Mini-user trial</td>
<td>Users testing products in a laboratory environment by fulfilling actual tasks (see 12.4.4)</td>
<td>The users gain a good idea of how the product behaves in use; Detailed issues may be revealed</td>
<td>Practicality and additional effort (e.g. testing kettles requires tap and sink); Safety/insurance issues (e.g. boiling water)</td>
</tr>
<tr>
<td>Product Personality Profiles</td>
<td>Users imagine a product as a person; Provides an insight into 'who' the user perceives to be the target user (see 12.4.6)</td>
<td>Projective technique to retrieve hidden information; Eliciting emotional perception, user stereotyping, and social value systems</td>
<td>Interpretation of the results may be complex; The participants may not like the activity and lack imagination for suitable examples</td>
</tr>
<tr>
<td>Using Mood Boards or Collages</td>
<td>Collection of images that represent an emotional response to the design task, the product, user etc.; Users may create the collection or it may be prepared by the design team beforehand (see 12.1.7)</td>
<td>Enabling users to communicate emotions non-verbally (visuals can transcend linguistic restrictions); Creating visuals that designers can use directly as inspirational material</td>
<td>Requires preparation or availability of suitable images; May be time-consuming; Users may be uncomfortable with the unfamiliar exercise</td>
</tr>
<tr>
<td>Brain-storming</td>
<td>Sharing all thoughts, ideas and comments about a particular topic – without any constraints (12.3.1)</td>
<td>Novel ideas or solutions may be generated, the users’ creative potential is encouraged</td>
<td>The user may not be accustomed to such tasks</td>
</tr>
</tbody>
</table>
Table 2.1b (continued)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users drawing their 'ultimate' product</td>
<td>Enables users to summarise and express their aspirations visually, suitable for after the discussion session (see 12.3.4)</td>
<td>Providing a different way of communication for the user; Provides visual stimuli for designers</td>
<td>Users may lack drawing skills; Users may be uncomfortable with the exercise due to lack of confidence</td>
</tr>
<tr>
<td>Creating 3D forms</td>
<td>Use of materials (e.g., modelling clay, cardboard) and tools by users to express their ideas and wishes (see 12.3.8)</td>
<td>3D representations aid the ease of communication; Perceived as easier task than drawing by users</td>
<td>Users may lack modelling skills; Users may be uncomfortable with the unfamiliar exercise</td>
</tr>
<tr>
<td>Nominal Group Technique</td>
<td>Structured group discussion technique; Involves the establishment of a consensus using a group-based categorisation and rating procedure (see 12.3.2)</td>
<td>The issues are examined to a great amount of detail; There is a clear outcome of the session in the shape of a list of agreed action points or main issues</td>
<td>The rules of the technique are rather complex; Detailed idea examination requires additional time and moderator skill</td>
</tr>
</tbody>
</table>

2.4 PLANNING THE RESEARCH

It is important to determine the objectives of the research clearly at the outset. For example, the design task may vary with different types of projects, or may differ depending on the amount of information available at the beginning of the project. Likewise, design tasks requiring incremental changes to products call for a different approach to those aiming at 'blue-sky' conceptual design solutions. Moreover, realistic objectives depend on the resources available. Setting the research objectives requires establishing and specifying the following:

- purpose and required outcomes of the research, including intermediate targets;
- resources available – including personnel, skills and expertise;
- most appropriate methods and techniques to be applied;
- time scale, including internal and external deadlines;
- target participants – for example, homeowners with experience in using coffee makers.

At the outset, it has to be clear what should be achieved with the research activities and how they fit into the 'bigger picture'. It is useful to develop a time plan similar to the one shown in Figure 2.2 – specifying the different activities, time scales, and interaction with other processes (in this case, the designing process). Project requirements can vary, from
conducting a single session to a whole series. This may depend on aspects such as the resources available, the type of project, and other complementary techniques to be used (e.g. home user trials). Whilst focus groups are suitable to accompany a large project through several stages, they may be applied just as an exploratory single session, or a clarifying final session (e.g. after a survey). It is often sensible to conduct at least two sessions though, as the outcomes may vary. This depends on the diversity of the participants.

| Focus group activity | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 | Week 13 | Week 14 | Week 15 | Week 16 | Week 17 | Week 18 | Week 19 | Week 20 |
|----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Plan research        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Define content       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Recruit subjects     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Prepare sessions     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Conduct focus groups | 1 2 3 4 | 5 6 7 8 | 9 10 11 | 12 13 14 | 15 16 17 | 18 19 20 | 1 2 3 4 | 5 6 7 8 | 9 10 11 | 12 13 14 | 15 16 17 | 18 19 20 | 1 2 3 4 | 5 6 7 8 | 9 10 11 | 12 13 14 | 15 16 17 | 18 19 20 | 1 2 3 4 | 5 6 7 8 | 9 10 11 | 12 13 14 | 15 16 17 | 18 19 20 |
| Data analysis        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Design activity      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Generate concepts    |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Produce 3D sketch models |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Develop concepts     |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Select concepts      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Refine concepts      |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| Produce appearance model |    |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |

Figure 2.2 Example of a timeline for a time-constrained design project

For new product development, we envisage the use of focus groups through all the stages of the designing process – including prior to concept generation (initial requirements capture), and throughout the designing process, to evolve and evaluate concepts. Focus groups can function as a concurrent complementary technique to the designing process, enabling information to be passed directly from one stage to another (see Figure 2.3).

After a stage of broad exploration, to understand user needs and aspirations, concept generation may commence. The contents of the sessions can be adjusted flexibly according to the information requirements of the different design stages. The close interaction between user research and concept development may continue as long as required – possibly beyond the concept design stage. The process is iterative and may require going back to earlier stages before progressing with the designing process. The different activities involved in planning, defining contents, recruiting, and preparing sessions, usually overlap to some extent as they are carried out in conjunction.

Intermediate targets and deadlines are important to keep track of the progress – particularly in larger projects. Having clear objectives helps to adjust intermediate tasks in case the research reveals unexpected opportunities or problems. It is vital to identify constraints and define the variables at the outset, whilst considering the resources available (e.g. time, budget, equipment, personnel). It is useful to draw up an initial plan of which activities to include during the sessions at which stages (see Tables 2.1a and b and the tools described in Chapter 12), thus specifying the length of the sessions and the materials required.

A detailed cost plan should be designed, ensuring that all cost factors are included – taking account of aspects such as the total number of participants, fee per session,
equipment and facilities needed and moderator training. Administrative costs include issues such as telephone use, producing letters, stamps, printing, photocopying, video/audio tapes, scanning, binding and batteries. Additional costs for visual stimuli and visual aids may include videos, prints, slides, renderings, drawings, models, prototypes, and product samples. The participants need to be made comfortable by providing light refreshments: the type served depends on the length of the session and the time of day/evening. There may be travel costs, required for participants and/or moderator. Room hire and other charges may need to be considered (e.g. video recorder, slide projector, multimedia projector). Paid assistance may be needed for tasks such as reception, hospitality, assistance, room presentation, administration, or preparation of materials. Moreover, indirect costs must not be overlooked – due to the time spent for preparation, analysis, and report writing.

Figure 2.3 The design research process in conjunction with the use of focus groups

A professional moderator may be hired, at an additional cost. However, the moderator must be closely involved within the planning of the sessions to ensure adequate familiarity with the topic and research aims. Attendance fees for the participants and costs of hospitality might vary. The authors have paid each participant £25 per three-hour session, and have provided light refreshments. Some participants, such as expert users, or users of less mainstream products, may be more difficult to recruit and may require a higher fee. Likewise, some participants may require none (e.g. when recruiting from the client organisation).

2.5 RECRUITING PARTICIPANTS AND PLANNING SESSIONS

Prior to contacting the participants, the length of the sessions, the number of participants per group, and the main activities involved, as well as times and locations for the sessions should be known. When planning time arrangements for the sessions, a variety of factors need to be considered:

- total time that participants are required for (depending on the activities to be involved and the anticipated attention span of the participants);
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- participants’ fee (e.g. £30 per three-hour session);
- time of the day (e.g. working day, weekend, daytime, evening);
- intended depth of the topic (participants need to be ‘warmed up’ to be able to consider the topics; longer sessions may involve the participants more intensely, but they will become tired);
- number of participants attending each session.

According to the authors’ experience, three hours have proved a suitable length for the sessions – combining focus group discussion with a variety of other techniques (e.g. mood boards). Providing varying activities and stimuli helps to maintain the participants’ interest. Figure 2.4 illustrates how different activities can be incorporated into a three-hour research session.

![Figure 2.4 Examples of activities that may be incorporated within a three-hour session](image)

The contents of the session need to be tailored to the research aims at each stage of the research activities, including issues such as the scope of the project, or the profile of participants. A sufficient number of breaks of about five to ten minutes need to be provided to support participants in refocusing their concentration. Usually, the sessions need to be conducted outside of normal office hours (e.g. 9am to 5pm), unless the employer is interested in the research. It is beneficial to conduct sessions in pairs on Saturdays (one in the morning and one in the afternoon), thus ensuring people are not too tired and minimising set-up time and preparation efforts.

In the earlier stages of a project, all-male and all-female groups may be conducted on the same day with the same contents. The decision to separate genders depends on whether the issues discussed are gender-sensitive (e.g. ensuring that no participants feel the need to hold back). At later stages in the project, mixed gender groups may be held – as the issues covered tend to be less personal and recruitment becomes easier that way.

The participants should be chosen carefully through *purposive sampling* (as opposed to random sampling for surveys) – by selecting participants belonging to specific user groups (Morgan, 1998b; Erlandson et al., 1993). The participants need to be reasonably knowledgeable about the topic, and should be interested in talking about it. For new product development, the profile of the target users determines the characteristics of the participants that can be selected. Some products have a wider user group, such as kettles, whilst some are more specialised, such as wheelchairs. It is important to identify from the outset if the participants should be customers or
considers, or both. The people who purchase a product (customers) are not necessarily
the users (consumers). Participant criteria for group composition may include:

- occupation
- age group
- income
- level of skill/expertise
- disability
- use of particular products
- education
- gender
- home ownership

The composition of the group should not be too wide. The less rigorous the participant
criteria are defined, the more variable are the outcomes. Ideally, the groups should not
include too many different types of people, whilst a certain amount of diversity may be
useful to encourage contrasting opinions and informative discussions. Participants need
to be comfortable in talking to each other and share a similar background to encourage
sharing of personal information, and more detailed insights. Different genders or age
groups may offer different attitudes to products, systems or services, thus providing
varying opinions.

Preferably, focus groups should consist of participants who are not too familiar with
each other – especially when the session will cover sensitive issues. Over-familiarity
between few members of the group may adversely affect the synergy of the group, and
may make participants feel alienated (Morgan, 1998b). However, some familiarity
between participants may help to ‘break the ice’ and encourage discussion.

These recruitment issues should be decided upon in close conjunction with the
objectives of the research. In some situations (e.g. practice-based research feeding
directly into an application) it may be perfectly acceptable not to conform to the general
rules, whilst in others it may be vital to not violate them (e.g. large-scale academic study
to investigate or establish general principles).

The time and effort required to prepare the research sessions should not be
underestimated. The total time required depends on a range of factors (e.g. number of
participants to be recruited, availability of resources). For example, to recruit for two
focus groups involving six participants per session, it may take about two weeks
(spending about two hours per day) to locate and confirm all participants’ attendance,
relying upon a reasonable social network. This is usually spread over a number of days. It
may take more time to recruit participants that should conform to a restricted set of
criteria, or experts from specific fields. Recruiting participants requires a variety of
associated activities:

- planning time scales, dates and locations;
- preparing (sending out) screening questionnaires, to ensure all people meet the
  recruitment criteria – if a strict set of criteria has been specified;
- preparing and distributing adverts (see Figure 2.5) and invitations (see Figure 2.6);
- communicating with participants (e.g. telephone, e-mail, letters);
- composing the groups (e.g. considering participants’ time preferences, ensuring a
  sufficient number of people in each group, dealing with late cancellations).

Traditionally, focus groups have involved around eight to ten people, though smaller
groups (four to six participants) may be more suitable for design research sessions, as
more time can be assigned to the individual views of participants. Some users may feel
intimidated by larger groups. The presence of fewer participants will also produce a more
comfortable and productive atmosphere, as a higher personal involvement may encourage
people to invest more in the session. However, involving more participants provides a
wider variety of opinions and ideas. The preparation effort required for small groups is
very similar to that for larger groups.

The task of recruiting may either be carried out by the researchers or may be given
to a recruitment agency. Suitable participants may be found by advertising in local
papers, through web-based newsletters, or by word of mouth. If available, lists of suitable
candidates can be used for contact through e-mail or telephone. It has to be made sure that keeping participant information complies with regulations such as the Data Protection Act (1998). For example, keeping subject details with individual questionnaire feedback must be avoided. Likewise, people’s details (e.g. address) may only be kept on file beyond the project scope if the people agreed to this. Recruiting requires the preparation of confirmation letters prior to the event (see Figure 2.6), and sending out maps that help users find the venue, and a general overview of the type of activities planned for the session to inform interested candidates.

Fancy getting paid to drink coffee, eat cake and chat?
Deana McDonagh and Anne Bruseberg (Department of Design and Technology) are looking for homeowners who would like to discuss their experience of kettles, coffee makers and toasters in a lively and friendly environment.
* Each person will receive £25 for attending
* Each session will last 3 hours and involve a discussion with some handling of products
* We will provide refreshments
If you are interested, we would be delighted to hear from you via Email (a.bruseberg@lboro.ac.uk) or phone (extension 2658).
Please include the following details: (a) name, (b) age, (c) gender, and (d) occupation.
All your details will be received in confidence.

Figure 2.5 Sample call for participants (used for web-based university notice board)

Dear Jo
Thank you very much for agreeing to attend our Focus Group research session on Saturday, 21 April, 9 am to 12 noon.
The sessions will be held in the Bridgeman Centre on the Loughborough University campus (where AVS is located, close to the towers). Please find attached a map of the campus showing the location in relation to the main gate. I, or my colleague Deana, will greet you there. If the door is locked, please press the doorbell. The most convenient car park is immediately outside the AVS office.
The session will involve 6 participants. Light refreshments will be provided. Payment of £25 will be made in cash. Please bring your National Insurance number to fill in the forms on the day.
We look forward to seeing you. Please do not hesitate to contact me should you wish to discuss any details further, or require more detailed directions to the meeting point.
Thank you very much for your co-operation.
Anne

Figure 2.6 Sample invitation letter
2.6 SPECIFYING THE CONTENTS OF THE SESSIONS

2.6.1 The Moderator's Guide

A moderator's guide (see Figure 2.7 for an example) needs to be prepared in advance. This determines the contents and structure of the session, including the following:

Discussion contents: objectives of the session, activities to be included, different topics to be covered (e.g. experience of product use, imagining the future and brainstorming, questions to be asked, time allowed for each activity).

Discussion character: moderator control on the direction of the discussion, intended flow of the discussion, level of openness.

Discussion aids: visual aids and external stimuli to be used to encourage discussion.

At the outset, it is important to decide how pre-defined the structure of the sessions should be, as this influences both the formulation of questions and the moderator style to be chosen. At one end of the spectrum, the discussion can be controlled and centred on the topics provided by the moderator. The participants are kept on track to answer a list of predetermined questions within a well-defined time scale. Equally, priority may be given to the interests of the participants and the discussion may be left to flow more freely (Morgan, 1998a).

A highly structured approach may be more appropriate for the less experienced moderator, as it helps to cover situations in which there is little response from participants. However, free-flowing discussions over longer periods (e.g. 15 minutes) require very little input from the moderator, as long as they do not stray too far from the question. The degree of structure can also depend on the goals of the research. The more exploratory the study is, the fewer questions need to be predetermined, and the more scope can be given to the issues that emerge as important to the participants and relevant to the project. This means that the outcomes will be variable, comparison between groups becomes more difficult, and more groups may be required in cases where establishing a series of clear-cut messages is the main aim of the study.

Questions need to be easily understood by all the participants, using familiar terms and words. It is important to stress at the outset that the participants should use their own familiar terms. The questions need to encourage participants to express their thoughts, by preferring 'open' questions to 'closed' questions — thus avoiding questions that only leave an option to say either 'yes' or 'no'. The questions should aim to promote group discussion.

The research aims should not be set too broad, too abstract, or too demanding. Likewise, it is important to avoid influencing the discussion through evaluative terms or over-specific questions. In order to generate discussion it can be useful to prepare questions and comments that provoke a response. A well-designed moderator guide anticipates the flow of a natural conversation, linking one topic to another (Krueger 1998b).

It is important to avoid trying to be over-ambitious in the number or questions, exercises and topics to be included. Nothing is worse than having to conduct a session under time pressure. However, it is useful to have additional exercises available — either for situations in which the participants do not respond with sufficient depth to a question, or if the session progressed faster than expected. These may be left to the end, and used if needed.
<table>
<thead>
<tr>
<th>Moderator's guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: 5 May</td>
</tr>
<tr>
<td>Moderator: Jo Bloggs</td>
</tr>
<tr>
<td>Client: The Kettle Company</td>
</tr>
<tr>
<td>Focus Group Number: 4</td>
</tr>
<tr>
<td>total: 3 hrs</td>
</tr>
<tr>
<td>0 min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-meeting drinks</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>The objectives of the project; the aims/programme for the session.</td>
</tr>
<tr>
<td></td>
<td>Practical issues: alert to video recording, confidentiality, sign consent form.</td>
</tr>
<tr>
<td>Visual evaluation of products (forms)</td>
<td>Please evaluate these products using these pictures only (like catalogue purchasing).</td>
</tr>
<tr>
<td>Warm-up discussion</td>
<td>Please consider the most important feature when buying a new coffee maker.</td>
</tr>
<tr>
<td></td>
<td>What makes you choose one product over another?</td>
</tr>
<tr>
<td></td>
<td>(Ask everyone in turn if responses are slow.)</td>
</tr>
<tr>
<td>Understanding the contexts of product use</td>
<td>What are the occasions on which you use a coffee maker?</td>
</tr>
<tr>
<td></td>
<td>Why do you own one/not own one?</td>
</tr>
<tr>
<td>Product handling A and form filling</td>
<td>Please examine these 3 products and fill in the product handling form for each of them. This is a self-contained exercise to prevent influencing others.</td>
</tr>
<tr>
<td>Feedback discussion</td>
<td>Please share your view on these products.</td>
</tr>
<tr>
<td>Product handling B and discussion</td>
<td>Take product to table, ask for volunteer to assemble parts out of the box; let people handle product parts.</td>
</tr>
<tr>
<td></td>
<td>Read out instructions from booklet.</td>
</tr>
<tr>
<td></td>
<td>Ask for comments on criticism/positives.</td>
</tr>
<tr>
<td></td>
<td>Retrieve views on technology, size, looks, ease of use, cleaning, coffee quality, safety, quality/durability.</td>
</tr>
<tr>
<td>Product personality profiles</td>
<td>We are going to have some fun now.</td>
</tr>
<tr>
<td></td>
<td>Please imagine that these products were persons with their own personality, job car, home etc.</td>
</tr>
<tr>
<td></td>
<td>Please use the forms to fill in your responses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aids</th>
<th>Duration</th>
<th>Start at</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forms in booklets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product printouts, forms in booklets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forms in booklets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forms in booklets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forms in booklets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theme sheets with pictures, video</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forms in booklets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forms in booklets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 coffee makers, forms in booklets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Bodum coffee maker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forms in booklets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Break</th>
<th>Duration</th>
<th>Start at</th>
</tr>
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<tbody>
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<td></td>
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</tbody>
</table>

**Presentation: The kitchen of the future**
I would like to give you some ideas about trends and future technology.
1. Comfort kitchen – large space, including other activities, social meeting place, aesthetics important.
2. Ultra-function kitchen.
3. High-tech kitchen – intelligent, automated, speeded up.

**Discussion: The kitchen of the future**
Now I would like to share your ideas about the kitchen of the future – 20 years from now. Please talk to each other. Which of the 3 trends would you prefer? Do you see any other trends?

**Discussion: Future devices**
Stand back and think about the devices we might have in the future. How can we make things differently/better? Are there alternatives for carrying out these tasks? Why do we use the current devices? Consider their history. Would you like devices to be combined into one? Consider the clutter in the kitchen.

**Purchasing priorities form**

**Ending session**

---

Figure 2.7 Example of a moderator's guide: data collection stage
The flow of ideas can be greatly improved by incorporating visual aids. The authors have gained positive feedback from users by continually providing idea stimulation material (e.g. various visuals, visions about future trends) as ‘food for thought’ throughout the sessions. External props and stimuli (i.e. models, sample products, and videos) need to be available before the session starts. Care needs to be taken not to overload the participants with visual stimuli.

2.6.2 Discussion Contents for Design Research Applications

One of the aims of carrying out user research is to enhance the lifestyle of people through providing products that respond to real user needs through more effective product development. Besides learning from existing products, user research may also aim to discover novel ideas, beyond the range of products that are currently available. Users can be engaged into creative activities to help uncover unmet user needs and to understand ideals – the imagination of how a perfect product could be.

It may be difficult to uncover unmet user needs. It is important that products are viewed in the context of use. Mainstream products such as kettles and toasters are products that are usually used in the domestic kitchen. Their use should not be studied in isolation. Likewise, it is much more useful to think about a device that fulfils the function of heating up water, than trying to improve on a product labelled ‘kettle’, as this restricts the users, as well as the designers’, ability to be creative. Questioning current product roles can aid innovative problem-solving, rather than simply re-considering what already exists.

Ideals may be difficult to conceptualise and articulate for the users. In general, users are not accustomed to considering alternatives beyond what is familiar to them and may already exist. Users may be asked to consider the 'future' in order to suspend reality, and think more laterally and creatively. Such activities may encourage participants to disclose their wishes, aspirations and ideals more freely. Individuals require a 'warm-up' to such activities. They should not be expected to take on the role of designers. This should be made clear within the introduction of a session. Giving users creative tasks is not an attempt to find solutions, but one way to extract needs and wishes, and communicate users' suggestions to the design team.

According to the authors' experience, people enjoy talking about their routines, lifestyles, and preferences – as they feel listened to and their views are being heard. The assessment of products is also perceived as enjoyable. Initially, participants display reservations towards creative tasks, such as brainstorming and drawing, especially if they feel that their skills are inadequate. However, the results are often productive and of considerable value to the design team.

2.7 PRACTICAL CONSIDERATIONS FOR SETTING UP FOCUS GROUP SESSIONS

The preparation of focus group sessions requires a range of activities. Recruiting participants and the scheduling of sessions involves maintaining contact with participants and clarifying arrangements for the location. If the material needs to be shared between several people, or is to be analysed later in more detail, then a video recording is valuable. Participant fees and type of refreshments to be served need to be predetermined. When not paying participants in cash, there may be a tax deduction and people should be made aware of this.
All necessary equipment and material need to be prepared in time. This includes:

- clarifying arrangements for recording (e.g. video camera) and presentation equipment (e.g. video recorder, slide projector);
- preparing forms required for payment arrangements (e.g. see Figure 2.8);
- developing questionnaires, such as consent forms (e.g. Figure 2.9), re-screening (e.g. Figure 2.10), and product evaluation questionnaires (e.g. Figure 2.11);
- providing writing supplies (a wire-bound folder for each participant is useful, containing all the forms, instructions and writing paper);
- preparing visual stimuli, such as concept models, prototypes, product samples;
- providing name cards or badges.

### Figure 2.8 Sample payment form (for cash payments)

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Signature</th>
<th>National Insurance number</th>
<th>If you do not have your National Insurance no. please give address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. &lt;name&gt;</td>
<td>6 Dec. 2010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>6 Dec. 2010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>6 Dec. 2010</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subject Consent Form

Department of Design and Technology
Loughborough University

I .................. ...........................................................................................................

consent to taking part in these experimental sessions to help the evaluation of small domestic appliances and elicit user needs.

An explanation of the nature and purpose of the procedure has been given by the experimenter. I understand that I may withdraw from the experiment at any time, and that I am under no obligation to give reasons for withdrawal.

I understand that any photographs taken and information about myself will be treated as confidential by the experimenter(s).

I agree to the session being audio taped and video recorded.
I understand that what I say may be used for research or to compile a report.

Date: ........................................

Signed: ...................................

Signature of Researcher: .................................
Organising and Conducting a Focus Group: The Logistics

Figure 2.9 Sample consent form

Thank you for taking part in this study. Your views and opinions are very valuable to this project. We would appreciate it if you could fill in the following details about yourself:

1. What is your age?
2. Gender? (please tick) male female
3. What is your present occupation?
4. What does your job involve?
5. How many paid hours do you work per week? Are you a homeowner? (please tick) yes no
6. How many people live in your household? How many of them are dependent children?
7. Did you purchase a domestic appliance within the last 6 months? If yes, what did you buy?
8. For small domestic appliances (e.g., coffee-maker), what kind of price category do you usually prefer purchasing at?
   a) a simple product at the lowest price
   b) a product with a minimum range of functions at a just below average price
   c) a good quality product with a few extras at an above average price level
   d) an expensive, top-of-the-range, high quality product that succeeds against most others

Figure 2.10 Re-screening form

Product handling questionnaire

Please explore the products as if you were in a retail showroom and assess the products for their ease of use. Please feel free to pick up each product. Use the questionnaires to fill in your responses for each product. Please do not spend longer than 5 minutes per product. Please feel free to ask any questions throughout this exercise. Please do not share your opinions with other participants during the exercise (to avoid influencing others).

1. What do you think of its visual appearance?
2. What is your perception of the quality (finish, suitability) of the product elements?
3. What is your opinion about the durability of the product?
4. What is your opinion about its ease of cleaning?
5. What do you think about the suitability of this product for the following tasks:
   a) placing slices in toaster
   b) choosing required function
   c) pressing down lever
   d) monitoring progress of toasting
   e) cancelling toasting early if required
   f) lifting out toasted slices

Figure 2.11 Product handling questionnaire

Whilst special focus group facilities (i.e. locations providing rooms with one-way mirrors, reception of participants, and catering) offer a convenient and professional
environment, there may be situations where an over-formal setting may be intimidating to participants. Focus groups thrive in an open, friendly, and informal atmosphere. People tend to forget the video camera quickly, once involved in engaging activities, but one-way mirrors might be particularly unfamiliar and appear threatening. The authors recommend that observers with a high interest in the results (e.g. a designer) should be made part of the session, or may view the video later. The choice of room depends on various factors, including:

- ease of access (e.g. security arrangements, travel required, wheelchair access);
- low level of disturbance (e.g. telephones, doorbells);
- ease of setting up equipment;
- comfort for the participants (e.g. sufficient size of the room, temperature control and adequate light sources);
- facilities (e.g. toilets);
- storage location and accessibility to the visual material (product samples).

Figure 2.12a illustrates the ideal layout for a session, using a round table enabling equal face-to-face contact. Rectangular tables may be more readily available (see Figure 2.12b). Ideally, the camera/video recorder should be positioned so that facial expressions and other non-verbal communications can be recorded. It is more important to capture the participants on videotape rather than the moderator.

The location for the refreshments and product samples within the room needs to be considered. The layout is often determined by the location of sockets, light sources, surfaces available, display boards etc. Safety is crucial when dealing with electrical equipment leads (e.g. to kettles in use, video cameras). Figure 2.13 shows an example of a room arrangement. In the situation shown, the moderator is introducing product concepts for evaluation. The moderator’s assistant is making notes, but may also operate the video camera, serve drinks, take photographs, uncover or unpack product samples.

Attention to the detail is important when preparing a session. Participants are more co-operative if they feel valued and are comfortable. Providing quality food and utensils
(e.g. tablecloth, ceramic mugs instead of paper ones) can make a considerable difference in creating a comfortable environment.

Figure 2.13 Layout example: the evaluation of design concepts by a female group

Key: A. Moderator  B. Concept line drawings  C. Video recorder
    D. Moderator’s assistant  E. Product samples

Name cards are important as they enable people to address each other during the discussion and to feel more familiar with each other. Forenames are usually more comfortable and easier to use. This should include the moderator and all other people present (e.g. observer, assistant). Stick-on badges are very simple to use. Writing down the names also provides a suitable activity during the initial meeting period, whilst having a cup of tea and waiting for remaining participants.

2.8 CONDUCTING FOCUS GROUPS

When participants begin to arrive, it is important to:

- receive them at the entrance;
- register their names;
- show them the way to the room;
- point out facilities (e.g. toilets);
- invite them to help themselves to refreshments (or serve them);
- give participants a few minutes to make themselves comfortable and to familiarise themselves with each other.

Initially, a good introduction should prepare participants for the research session and help to make them feel welcomed. It is essential to establish basic rules for the discussion (e.g. only one person speaks at a time), to emphasise that all comments are valued, and stress
that it is a non-judgmental meeting (Poulson et al., 1996). Figure 2.14 shows an example of practical issues to be addressed during an introduction.

Welcome to <company name/location>. Thank you for making the time to join us this morning/afternoon. My name is <moderator's name>; I am the main researcher for today’s session.

The session will last <duration> hours and involve a range of activities, including form filling and exploring products.

With your consent, we would like to videotape and photograph the session. This will help us later to analyse the material. Therefore, it is essential that we speak one at a time. Otherwise, your valuable comments may be lost.

All your feedback will be received in the strictest confidence. From now on, you will be referred to as a ‘subject number’, and not under your name, when analysing and presenting your feedback.

Your views and comments are immensely important to us and we need to hear all your thoughts.

We have aimed for this session to be enjoyable and informative. It is important to us that you feel comfortable. If at any time, you do not understand, or you feel uncomfortable with the session, please let us know as a matter of urgency.

The refreshments are available throughout the session and we will have dedicated breaks. The toilet facilities are to be found <here>.

Figure 2.14 Sample introduction

When moderating, it is important to find an appropriate balance between leading the session with a high level of control, and letting the discussion run on with no interruptions. It is crucial to ensure interaction amongst participants. Participants should be encouraged to avoid addressing their answers to the moderator. The moderator may literally pull away slightly from the table to encourage group interaction. It is not advisable for the moderator to take notes during the focus group discussion, unless no other recording is made, as this activity tends to stall discussion.

To formulate a new question it is useful to first introduce the new theme (e.g. ‘Next, I would like you to consider the breakfast’). Then, the question needs to be stated clearly. (e.g. ‘Please share with us your breakfast making procedures’). It is beneficial to underpin this with one or two additional questions or challenges (e.g. ‘Do you have breakfast at all?’; ‘What types of food and drink do you prepare?’). Whilst people are starting to consider their answers, it might be useful just to re-state the question to clarify (e.g. ‘What do you do for your breakfast?’), and then to invite contributions and discussion.

It is important to convey only non-judgmental messages (e.g. by avoiding saying ‘yes’ or ‘no’) to continually encourage the participants, as well as to display an interest in what they are saying. It is vital to create a good atmosphere throughout the session and ensure that participants are comfortable.

Moderating also involves preventing dominant participants from having too much influence on the discussion and ensuring all participants are contributing. Extra care may be needed, as some participants may be unfamiliar with form filling, speaking publicly, or expressing their views. The moderator needs to be aware of, and responsive to,
participants' skills and abilities. Table 2.2 shows some of the problems a moderator may have to deal with, and how to tackle them.

The overall structure should be regarded as quite flexible. There is often a need to extend an exercise or topic that reveals more interesting facts than expected, or takes more efforts that anticipated. On occasions, new questions arise out of the context. Then other exercises might need to be skipped or minimised.

Table 2.2 Moderating strategies to deal with problems (continued overleaf)
There are several possible causes for lack of response:

(a) *The participants are not sufficiently 'warmed up' and find the question too difficult.* Participants need some time to become accustomed to the environment and the general topic. The discussion should always start off with some 'easy' questions to which everybody should have something to say and to focus people's minds on the topic. The participants may need to think about the answers first. Participants greatly benefit from 'food for thought' (e.g. video, sample products). Example thoughts from the moderator, or a deliberately controversial opinion, are vital tools to have prepared in case the response is slow.

(b) *The participants have not understood the question.* It is important to state clear questions that are not too complex (e.g. abstract thoughts, many enclosed sub-questions). It may be necessary to reformulate the question if there seems to be a misunderstanding. Highly academic terms or jargon may be particularly unsuitable, depending on the participants.

(c) *The participants feel uncomfortable or intimidated by the unusual environment, or nobody wants to make a start.* It is vital that the participants are put at ease through the creation of an informal and friendly atmosphere. Humour often makes people comfortable. People need to be reassured that the moderator is really listening and all inputs are vital. Moreover, it is often useful to include exercises at the beginning, requiring input from everybody (e.g. 'How much time do you spend in your kitchen per day, doing what? Let's go round the table and start with X.'). It may be useful, on occasions, to invite the first contribution from somebody in particular, but making sure that this is a different person each time. Again, the moderator may start off the discussion with a personal example opinion.

(d) *The participants are not knowledgeable about the issue or not interested in talking about it.* It might be necessary to abandon a question if all efforts fail to encourage responses. Then it is important to have alternative questions available.

(e) *The participants feel tired or bored.* It is vital that breaks are not being forgotten. A series of variable activities (e.g. questionnaire - video - discussion 1 - getting up to view products - discussion 2) helps to keep people interested and occupied, and are less stressful. Moreover, the enthusiasm of the moderator influences the behaviour of the participants significantly. It is valuable to introduce every task as a 'special' exercise that is going to be exciting, enjoyable, and vitally important.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are no responses to a question, or the discussion 'dries up' too quickly</td>
<td>There are several possible causes for lack of response:</td>
</tr>
<tr>
<td>(a) <em>The participants are not sufficiently 'warmed up' and find the question too difficult.</em> Participants need some time to become accustomed to the environment and the general topic. The discussion should always start off with some 'easy' questions to which everybody should have something to say and to focus people's minds on the topic. The participants may need to think about the answers first. Participants greatly benefit from 'food for thought' (e.g. video, sample products). Example thoughts from the moderator, or a deliberately controversial opinion, are vital tools to have prepared in case the response is slow.</td>
<td></td>
</tr>
<tr>
<td>(b) <em>The participants have not understood the question.</em> It is important to state clear questions that are not too complex (e.g. abstract thoughts, many enclosed sub-questions). It may be necessary to reformulate the question if there seems to be a misunderstanding. Highly academic terms or jargon may be particularly unsuitable, depending on the participants.</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
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<td></td>
</tr>
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<td></td>
</tr>
</tbody>
</table>

Table 2.2 (continued)
### Organising and Conducting a Focus Group: The Logistics

<table>
<thead>
<tr>
<th>Problem</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion flows well but is diverting from the desired topic; when to move on to the next topic?</td>
<td>Valuable time may be lost when letting the conversation stray to side issues. It is important that all participants have a clear idea of the direction of the question asked and are able to keep it in mind. It may be useful to provide a written memo (e.g. an overview of what was asked on a sheet in a booklet, also providing space for written notes). Discussions have their own dynamics. They can flow quite randomly depending on individual’s inputs. It may be difficult to determine what is relevant, especially when the participants are the only experts. Interesting unexpected issues may be revealed when not assuming too early that the discussion content is unrelated. Often the conversation moves back on to its original path anyway. Frequent refocusing activities by the moderator may discourage input or cut off the flow. However, if the moderator feels uncomfortable with the direction of the conversation for more than 3-4 minutes, an intervention may be needed. This is done best in the shape of an actual contribution, rather than a request to come back to the original question. The moderator has to keep to the overall time scale but should allow some flexibility as to how much time to allow for each question. This needs to be handled flexibly throughout the session.</td>
</tr>
<tr>
<td>Single participants keep taking over the conversation</td>
<td>To reduce input from dominant personalities, the invitation to speak may deliberately be given more often to quieter members of the group. Avoiding eye contact helps to discourage too frequent input from dominant participants. They may need to be cut short occasionally, without being too aggressive. Then they often realise that they misjudged their level of input and give more space to others. It is beneficial to observe people’s personalities during the initial cup of tea (before inviting people to have a seat) to identify dominant personalities. They may be invited to sit next to the moderator, thus being in a less prominent position and easier to control.</td>
</tr>
<tr>
<td>Some participants never say anything</td>
<td>Quiet participants require additional encouragement. This can be done occasionally by asking them directly for opinions at the beginning or the end of discussing a particular topic. This should be done infrequently though, so they do not feel like being ‘picked on’. Rewarding their contributions through displaying additional attentiveness may encourage them. Controlling dominant personalities sometimes encourages more reserved participants. Once some people have said something for the first time, they then feel more confident. Hence it is useful to include exercises that require input from all at the beginning of the session. This may remain the only time they contribute, however, they have to be given their own choice. Being friendly, inviting and non-judgmental is the best strategy.</td>
</tr>
</tbody>
</table>

#### 2.9 DATA ANALYSIS

Much of the analysis consists of transcribing thoughts, ideas and comments from the tapes, entering the questionnaire results (if used) into a database, and arranging the comments into suitable groups. Then general themes and categories of user needs may be
identified to make the information more manageable. The data analysis can be a complex process.

For the application of new product development, it is beneficial if designers are closely involved in the data analysis process. The analysis may either be carried out directly by designers, or design researchers may examine the material and present the results to designers. Direct study of the video tapes and feedback forms by designers allows them to become immersed once more into the user reactions and ideas. People’s emotional reactions, experiences and ideas may be suited best to prompt ideas in the mind of designers. By dealing with the data directly, designers are much more likely to make use of ‘trigger’ words and ideas, to ‘spark’ creative thinking. Engaging with a range of impressions may be the best way of prompting inspirations – rather than dealing with a written summarised report. A final report may be required and can function as a vehicle to communicate the findings. The actual process of transforming the data into information is when actual learning takes place, leading to increased empathy and understanding. Designers may collaborate with specialised researchers, thus saving a considerable amount of time. Having been involved in the research activities, summarised results become more meaningful to designers.

There is no need to carry out an overly extensive data analysis, such as detailed verbatim transcriptions or discourse analysis. Making notes of the essence is sufficient. Moreover, extensive comparison of data between groups or participants is not advisable unless the groups (a) have been homogeneous (regarding the types of participants as well as structure of the discussion) and (b) involved a substantial number of participants. It is beneficial to not rely on only one source of data, but to incorporate the results from the various techniques employed (i.e. conversations, average-rating scales from questionnaires used during the session, written comments) to triangulate the data.

Summarised transcriptions of conversations can be carried out with varying degrees of detail, largely depending on how much time is available. The efforts required may also vary depending on the sound quality of the recording, the clarity of expressions, and/or the variety of contrasting opinions. Experience has shown that one hour of conversation might take three to four hours to ‘transcribe’ and summarise. Identifying the information and making use of it goes beyond simply collecting data – it takes time and effort as well as skill. Care should be taken to reduce any bias during the analysis; ensuring equal consideration is given to the input from all participants on all aspects covered.

Figure 2.15 shows samples of how a video may be transcribed. It may be useful to determine certain symbols (e.g. abbreviations, new bullet for new thought, semicolon dividing speakers within the same line of thoughts), thus minimising efforts. The notes do not have to be in sentence format – as long as the meaning remains clear to the researcher. Likewise, certain sections may be summarised even more, thus making the message even simpler to read. When presenting the results to others, it may be useful to prepare further summarised results. Figure 2.16 shows a summary of experiences of breakfast making and eating from one group. Figure 2.17 shows a summary of the results from evaluating sample coffee-makers through questionnaires after two sessions. Table 2.3 shows a way of categorising the results. The transcripts were analysed by establishing groups of thoughts with different ideas belonging to them. To establish an idea of importance, occurrences of mentioning a similar or the same thought were counted, thus leading to a total for each category. This may not have been influenced by the relative importance of the aspect only (e.g. some aspects may not be mentioned as they are generally 'understood'; some additional questions lead to a discussion of a topic at more depth). They only give a general idea of relative importance, but a very useful overview of the discussion contents.
Organising and Conducting a Focus Group: The Logistics

What do you do in your kitchen?
- Lots of DIY (easy to clean, no other place), not eating
- When I eat on my own, I have all my meals there, coffee with friends, relaxing, has been made functional to be able to sit in there, have space
- Kitchen is entrance; same with me; also phone in the kitchen, smoke there, useful for paperwork
- because there is a lot of work surface
- My kitchen is a tip, need to be able to close the door
- Kitchen is not so much just for cooking anymore, now kitchen more open to visitors
- Part of my kitchen is play area for the kids – another room for them to go if other rooms are busy
- Kitchen has become more cluttered, less defined

Views on the current kitchen
- Too many gadgets, some not even used regularly, have not got enough plugs – might need to combine them?
- Mixers have improved – are more multifunctional now, has taken a lot of time to improve
- Old devices often better, new food processor not functional, difficult to clean, never use it, did it by hand in the end
- Many modern things are too complicated, experience with ultra-modern grill/toaster, couldn’t work out how to do it; microwaves often too complex (defrost, weights) – couldn’t work the mixer, gave it away

Appliance ideas and wishes
- Have an appliance that you can take out of the cupboard and put it on any surface and use it to cook on, put it away if you’re not using it – multi-purpose, boil milk/roast on it
- I think we are snowed under with gadgets
- There is another gadget: to be able to run in/out, grab food, set it up in the morning, put it in, keep it cool during the day; when coming back home talk to the oven to start heating it (yes often have to wait for defrosting, then cook...), in the future we’ll probably combine cooling and heating
- Machine that can learn from experience – teach it how to cook once certain food that is used regularly, to be repeated, just feed it the materials
- Just a toaster that works, toasting to the right level

Figure 2.15 Sample notes from the video (male group)

Your breakfast
- Breakfast during the week is rushed
- Some people prepare breakfast for others (kids) rather than for themselves
- Many go through a set routine and would like things to be more automated
- Some would rather like to enjoy a leisurely breakfast and most wish eating would be more of a social occasion (trend now: eat separately, food on knees in front of TV, even eat standing up)
- One member does not enjoy eating and talking and sees meals as much more functional, not as a suitable occasion for social meeting
- Maybe in the future we will have more time and revert back to social eating, taking time etc.

Figure 2.16 Sample summaries of issues from the discussion

Coffee-makers
- Although people liked product E for best appearance the winner was C – probably because it received high marks both for aesthetics and ease of use, and provided an additional function (second in appearance, balance of all aspects)
- E lost out possibly due to the poor appearance of the controls, the lack of monitoring the progress of coffee-making
- Even though D got the highest marks for ease of use, people opted for the looks, quality, durability
- Coffee-makers are more of a prestige/fun product for many – taken out on more special occasions, used less frequently
- Hence durability, timelessness, good appearance is important

Figure 2.17 Sample summaries of issues from questionnaires
Table 2.3 Extract of the category analysis for overall values regarding kitchen appliances; sorted by frequency of mentioning (right column)

<table>
<thead>
<tr>
<th>Category</th>
<th>Tally</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REDUCING TIME</strong></td>
<td></td>
</tr>
<tr>
<td>Automation: to support/help/ease; reduce boring tasks/tedious preparation/repetitive tasks, give reminders, cut down procedures (cooling-heating); don't ever hand wash – all to washer, no pots that are not dishwasher proof</td>
<td>32</td>
</tr>
<tr>
<td>Intelligence – dial a meal, food-sensitive, programmable, online cooking help</td>
<td>15</td>
</tr>
<tr>
<td>Cut out CLEANING TIME spent (e.g. washing up, tidying)</td>
<td>13</td>
</tr>
<tr>
<td>No time lag/INSTANT action (boiling water/drink at right temperature); speeding up basic functions (quicker oven)</td>
<td>12</td>
</tr>
<tr>
<td>SELF CLEANING (and drying, polishing, putting away)</td>
<td>12</td>
</tr>
<tr>
<td>Saving TIME Important</td>
<td>11</td>
</tr>
<tr>
<td>Avoid extra time to do unneeded HANDGRIPS (e.g. need to use switches, decant into intelligent container, open/close toaster)</td>
<td>7</td>
</tr>
<tr>
<td>EFFICIENCY is vital (before/during/after use) – reduce additional handgrips (e.g. fridge to cooker), less tiring/boring things to do, quicker progress, things to work first time (do the job, no ambiguity, reliability), lack of co-ordination between appliances, easy to clean, cut down TIME/EFFORTS – most important during working week</td>
<td>4</td>
</tr>
<tr>
<td>Low maintenance</td>
<td>3</td>
</tr>
<tr>
<td>Barcodes on prepared food to be read by microwave (automatic cooking or reading out instructions); swipe in ready made meals</td>
<td>2</td>
</tr>
<tr>
<td>People eat pre-processed food instead of using all the gadgets they own</td>
<td>1</td>
</tr>
<tr>
<td>Cooking books etc. currently popular for quick cooking</td>
<td>1</td>
</tr>
<tr>
<td><strong>EASE OF USE</strong></td>
<td></td>
</tr>
<tr>
<td>EASE OF CLEANING is very important, part of aesthetics pleasure (e.g. surface, knobs, grooves, disassembly etc); HYGIENE (knobs dirt traps)</td>
<td>30</td>
</tr>
<tr>
<td>Convenience/ease of use</td>
<td>22</td>
</tr>
<tr>
<td>EASE OF USE/SIMPLICITY – cannot cope with too much complexity</td>
<td>11</td>
</tr>
<tr>
<td>Importance of accessibility – reach all</td>
<td>2</td>
</tr>
<tr>
<td>CO-ORDINATION of functions (walk-in gadget, powerhouse)</td>
<td>1</td>
</tr>
<tr>
<td><strong>FUNCTIONALITY</strong></td>
<td></td>
</tr>
<tr>
<td>DO THE JOB:FUNCTIONALITY (e.g. lack of quality for microwave)</td>
<td>39</td>
</tr>
<tr>
<td>Aesthetics important but kitchen is primarily FUNCTIONAL (e.g. cherished items appreciated for their function, people prioritise functionality/ease of use when considering purchase)</td>
<td>2</td>
</tr>
<tr>
<td>FUNCTIONALITY and the LOOK of functionality is important</td>
<td>1</td>
</tr>
<tr>
<td>Displays big enough</td>
<td>1</td>
</tr>
<tr>
<td><strong>RESISTANCE TO AUTOMATION/DIFFERENT TECHNOLOGIES</strong></td>
<td>34</td>
</tr>
<tr>
<td>Fear of failure of high-tech equipment/LACK OF TRUST (quality of food produced through automated devices); RELIABILITY</td>
<td>15</td>
</tr>
<tr>
<td>Fear of lack of control through automation/intelligence</td>
<td>6</td>
</tr>
<tr>
<td>Loss of skills through automation of tasks; loss of involvement, fun, tradition; makes you lazy</td>
<td>6</td>
</tr>
<tr>
<td>Loss of quality (e.g. taste)</td>
<td>3</td>
</tr>
<tr>
<td>Pre-processed food not healthy</td>
<td>2</td>
</tr>
<tr>
<td>Habit – don’t like to miss what I’m used to (e.g. gas cooking)</td>
<td>1</td>
</tr>
<tr>
<td>Prefer natural things: less waste, direct access</td>
<td>1</td>
</tr>
<tr>
<td>SAFETY (e.g. Inductive hobs, hot kettles falling); particularly when children around</td>
<td>22</td>
</tr>
<tr>
<td><strong>SPACE</strong></td>
<td></td>
</tr>
<tr>
<td>SPACE is very important, people hate CLUTTER – too many gadgets, sockets taken up, less defined</td>
<td>13</td>
</tr>
<tr>
<td>Devices too big – need to justify their functionality, need surface area to prepare food etc.</td>
<td>7</td>
</tr>
<tr>
<td>People want easy/instant ACCESS yet prefer things tidied away; everything compact, all put away but not too far (swinging units/doors)</td>
<td>2</td>
</tr>
</tbody>
</table>
It may be beneficial to collect particular phrases and quotations. The availability of a video capture card and a CD writer is recommended to be able to store passages of speech on hard disk, particularly for communicating the results to others. When presenting data from the research sessions it is advisable to ‘scramble’ the images of participants to protect confidentiality (e.g. by saving the file with poor video quality).

A spreadsheet such as EXCEL is a useful tool for the data analysis. It may be used to arrange quantitative questionnaire results, as well as participants’ comments. Preparing a list with negative and positive adjectives for each product, based on user feedback to existing products, is a useful tool for designing (see Figure 2.18). It records participants’ preferences, perceptions and language.

<table>
<thead>
<tr>
<th>Product</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Cheap</td>
<td>Bulky base rim</td>
<td>Big and bulky</td>
<td>Bit space age</td>
<td>Dark edges</td>
</tr>
<tr>
<td>Clean looking</td>
<td>Awkward (to use)</td>
<td>Cheap, fragile</td>
<td>Bulky and clumsy</td>
<td>Dark edges</td>
<td>Wood</td>
</tr>
<tr>
<td>Colour universal</td>
<td>Bulky</td>
<td>Fussy controls</td>
<td>Clunky</td>
<td>Digital switches</td>
<td>Wood</td>
</tr>
<tr>
<td>Flimsy</td>
<td>Light and flimsy</td>
<td>Too big/too heavy</td>
<td>Fussy</td>
<td>Black and white</td>
<td>Digital switches</td>
</tr>
<tr>
<td>Little legs – different</td>
<td>Wing bits at side</td>
<td>Too rounded</td>
<td>Heavy</td>
<td>Gimmicky</td>
<td>White</td>
</tr>
<tr>
<td>Not terribly modern</td>
<td>Too complicated</td>
<td>Old-fashioned</td>
<td>Industrial looking</td>
<td>Inset toast rack</td>
<td>White</td>
</tr>
<tr>
<td>Plastic – cheap</td>
<td>Too fussy</td>
<td>Knobs protruberant</td>
<td>Old-fashioned</td>
<td>Light and flimsy</td>
<td>White</td>
</tr>
<tr>
<td>Poor graphics</td>
<td>Unusual/solid</td>
<td>Ridges down side</td>
<td>Looks cheap</td>
<td>Looks cheap</td>
<td>White</td>
</tr>
<tr>
<td>Prefer streamlined</td>
<td>Ugly</td>
<td>Too complicated</td>
<td>Not symmetrical</td>
<td>Not symmetrical</td>
<td>White</td>
</tr>
<tr>
<td>Simple</td>
<td>Too modern</td>
<td>Too large</td>
<td>Too wide (long)</td>
<td>Too big, too heavy</td>
<td>White</td>
</tr>
<tr>
<td>Too light</td>
<td>Quick to date</td>
<td>Too retro-looking</td>
<td>Too big, too heavy</td>
<td>Too big, too heavy</td>
<td>White</td>
</tr>
<tr>
<td>Untraditional</td>
<td>Too many lines and shapes</td>
<td>Too many knobs and buttons</td>
<td>Too many knobs and buttons</td>
<td>Too many knobs and buttons</td>
<td>White</td>
</tr>
<tr>
<td>Prefer colour</td>
<td>Too many bits and pieces</td>
<td>Ugly controls – not balanced</td>
<td>Ugly controls – not balanced</td>
<td>Ugly controls – not balanced</td>
<td>White</td>
</tr>
<tr>
<td>co-ordination</td>
<td>Prefer simple, clean lines</td>
<td>Things should look forward not back</td>
<td>Things should look forward not back</td>
<td>Things should look forward not back</td>
<td>White</td>
</tr>
<tr>
<td>Poor surface quality</td>
<td>Trying too hard (no real finesse)</td>
<td>Commercial like catering model</td>
<td>Commercial like catering model</td>
<td>Commercial like catering model</td>
<td>White</td>
</tr>
<tr>
<td>Large for two-slice toaster</td>
<td>Pretty lines make ugly shape better</td>
<td>Too complex for simple job</td>
<td>Too complex for simple job</td>
<td>Too complex for simple job</td>
<td>White</td>
</tr>
<tr>
<td>Product A</td>
<td>Clean and smooth</td>
<td>Attractive</td>
<td>Clean</td>
<td>Additional features</td>
<td></td>
</tr>
<tr>
<td>Clean and smooth</td>
<td>Clean-looking</td>
<td>Clean</td>
<td>All functions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean lines</td>
<td>Detailing quite good</td>
<td>Compact</td>
<td>Clean looking durable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compact size</td>
<td>Easy to clean</td>
<td>Curved shape</td>
<td>For family use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control at side</td>
<td>Fairly contemporary</td>
<td>Durable</td>
<td>Functional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional</td>
<td>Friendly</td>
<td>Fashionable</td>
<td>Functional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Looks easy to use</td>
<td>Good fun</td>
<td>Functional</td>
<td>Functional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neat</td>
<td>Light</td>
<td>Good quality</td>
<td>Good quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sharp edges</td>
<td>Nicer without grid</td>
<td>Stydy base</td>
<td>Stydy base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nothing to offend</td>
<td></td>
<td>Modern colourlook</td>
<td>Manual controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plain/average</td>
<td></td>
<td>Not too many dials</td>
<td>Professional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>Robust</td>
<td>Shiness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curves in shape/rounded contours</td>
<td></td>
<td>Simple clean shape</td>
<td>Slightly retro - streamlining</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wavy line softens</td>
<td></td>
<td>Smooth and efficient-looking</td>
<td>Functions override shape</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smooth surface</td>
<td></td>
<td>Blends with many colour schemes</td>
<td>Simple and curvy shape</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unfussy</td>
<td></td>
<td>Hygienic, good surface finish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple styling/s</td>
<td></td>
<td>Simple lines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No sharp edges</td>
<td></td>
<td>Sturdy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nothing to offend</td>
<td></td>
<td>Uncomplicated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plain/average</td>
<td></td>
<td>Sleek</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical</td>
<td></td>
<td>Solid, well made</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.18 Product adjectives listing for several toasters
2.10 CONCLUSION

Focus groups provide qualitative data. The synergy between participants during discussion is a valuable tool to gain new insight. Focus groups are flexible, enabling the incorporation of a wide range of discussion topics, as well as additional techniques. They require a considerable amount of time and effort. It is important to involve the people who are going to use the results (e.g. designers) closely into planning, conducting and analysing the sessions.

Planning the research involves issues such as clarifying objectives and variables, determining time scales, and identifying potential costs. This has to be carried out in close conjunction with determining recruitment requirements and establishing the contents of the sessions. A moderators' guide is a vital tool to prepare the order of different tasks and questions, enabling a natural flow of the discussion. Questions should encourage discussion between participants. It is useful to understand people's ideals through exercises, enabling participants to suspend reality.

Preparing the sessions requires a variety of activities, including recruiting, making materials and equipment available, providing refreshments, and physically setting up the room. Conducting focus groups benefits significantly from a friendly atmosphere in which the participants feel valued. During data analysis, summaries of various levels of detail help to narrow down the richness of the data into a series of categories and overall conclusions.

The flexibility of the approach means that contents can be adjusted as required. For example, users can be involved at all stages of the concept designing process. For design-research, focus groups contribute towards evidence-based design decision-making. A large-scale study will provide in-depth information, but a 'down-sized' version may still be valuable to designers due to the qualitative character of the data.

2.11 REFERENCES

CHAPTER 12

Focus Group Tools

Joe Langford and Deana McDonagh

INTRODUCTION

As the contents of this book show, when ergonomists and designers use focus groups (or related techniques such as user group workshops or discussion groups), they adapt the basic focus group method to suit their specific requirements. Frequently, this involves introducing additional activities to the more normal discussion-based approach.

This part of the book summarises the main types of additional tools and activities that designers and ergonomists can employ to extend the effectiveness of focus groups. It is intended as a reference section, allowing the reader to identify methods that could be helpful to them and to provide sufficient information to get them started. These are useful both for those new to focus group methods and for those who are more experienced, but may be seeking inspiration for new ways of doing things.

The techniques and methods described within this section have been drawn from the contributing authors and from wider afield. The methods included are those considered most suitable for use within a focus group context and within the fields of human factors/ergonomics and design in particular. There are many more related tools and techniques described elsewhere, but these are not included because they are more suited to business and marketing applications. For more information on such methods, see Higgins (1994), Clegg and Birch (1999) and Greenbaum (1998).

Much effort has gone into finding examples of the tools and techniques used by ergonomists and designers to enhance focus groups. Those reported in human factors/ergonomics and design-related publications are often quite similar, even though they may be named differently and used for different purposes. Where there are obvious similarities and overlaps between methods, they have been grouped together in this book for the sake of simplicity.

USING THE METHODS IN THIS BOOK

There are many possible variations to the basic ideas described in the book. Indeed, whilst reviewing the literature to compile this summary, many examples of 'mixing and matching' of ideas were found. It is not intended that the descriptions given here should be strictly adhered to in a prescriptive manner. They are presented as basic techniques that can be adopted and adapted to suit specific purposes.

Note also that it is often helpful to use several different tools together. In Chapter 2, Anne Bruseberg and Deana McDonagh provide an example of a focus group plan that incorporates a range of different activities including visual evaluation of products, product handling and product personality profiles as well as conventional discussion sessions. In participatory design (see Chapter 11), the whole process can involve many different activities spread over several sessions, as in Design Decision Groups. It is common to find a whole range of activities linked together to enable the group to get to
grips with the problem, generate solutions and then evaluate them, perhaps using mock-ups and simulations.

A word of warning: some of the techniques described here require participants to take part in activities that they might consider quite unusual. It is important that this is taken into account when planning discussion sessions. If participants are unfamiliar with a particular technique, this can result in them feeling uncomfortable or, worse still, lead them to resist or withdraw from the activity. It is extremely important that each participant feels comfortable and secure at all times.

HOW TO USE THIS CHAPTER

In this chapter, each technique is described briefly, along with the main advantages and disadvantages. In many cases examples are also provided. The descriptions of the methods are grouped by type.

Immersion and warm-up tools. Activities that are used to create an appropriate environment for effective discussion and idea generation to follow. These techniques are designed to prepare users in advance of the session, to get them in the mood for discussion, or simply to 'break the ice'.

Problem analysis tools. More formal, systematic tools that can be used to deconstruct a problem. These are useful as part of a session aiming to understand a particular problem before going on to find solutions, for example, in the context of a participatory design project. They might also be used by designers to help define a problem brief.

Idea generation and development tools. Techniques to enable the creation of new ideas and/or development of these. These often involve some form of hands-on activity. They may also involve, or be followed up by, some form of concept evaluation technique.

Concept evaluation tools. Activities that enable existing or proposed solutions to be assessed by participants. Some of these are relatively informal and unstructured, whereas others are more systematic, some of them involving numerical analysis. Concept evaluation is often the primary purpose of a focus group session, but is sometimes used as a starting point for the generation of new ideas.

Many of the techniques included here are multi-purpose. For example, brainstorming is an extremely versatile technique that could legitimately be placed in each of the above categories. In cases such as these, the primary or most appropriate use of the technique has been used to define its type.

The individual tools are listed in the following two index tables. In Table 12.1, they are listed by type, in the order in which they appear. In Table 12.2, they are listed alphabetically. Each method has a reference number to help locate it in the text.
# Focus Group Tools

Table 12.1 Tools and techniques listed by type and showing additional uses

<table>
<thead>
<tr>
<th>Immersion and warm-up</th>
<th>Problem analysis</th>
<th>Idea generation and development</th>
<th>Concept evaluation</th>
<th>Ref. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
<td>•</td>
<td>Tools primarily for immersion and warm-up</td>
<td>Workbook</td>
<td>12.1.1</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Diary/journal</td>
<td>12.1.2</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Photographic record</td>
<td>12.1.3</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Video record</td>
<td>12.1.4</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>‘Day-in-the-life’ exercise</td>
<td>12.1.5</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Bring an object</td>
<td>12.1.6</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Collage/mood board</td>
<td>12.1.7</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Cognitive map</td>
<td>12.1.8</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Round-robin questionnaire</td>
<td>12.1.9</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Thought bubbles</td>
<td>12.1.10</td>
</tr>
<tr>
<td>•</td>
<td>•</td>
<td></td>
<td>Word map</td>
<td>12.1.11</td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for problem analysis</td>
<td>Cause and effect analysis</td>
<td>12.2.1</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for idea generation and development</td>
<td>Nominal group technique</td>
<td>12.3.2</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for idea generation and development</td>
<td>How-how diagram</td>
<td>12.3.3</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for idea generation and development</td>
<td>Drawing</td>
<td>12.3.4</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for idea generation and development</td>
<td>On-line illustrator</td>
<td>12.3.5</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for idea generation and development</td>
<td>Storytelling</td>
<td>12.3.6</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for idea generation and development</td>
<td>Two-dimensional (layout) modelling</td>
<td>12.3.7</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for idea generation and development</td>
<td>Three-dimensional (form) modelling and mock-ups</td>
<td>12.3.8</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for idea generation and development</td>
<td>Design decision groups</td>
<td>12.3.9</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for concept evaluation</td>
<td>Scenario-based discussion</td>
<td>12.4.1</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for concept evaluation</td>
<td>Visual evaluation of product/system</td>
<td>12.4.2</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for concept evaluation</td>
<td>Product handling</td>
<td>12.4.3</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for concept evaluation</td>
<td>Product/system user-testing</td>
<td>12.4.4</td>
<td></td>
</tr>
<tr>
<td>•</td>
<td>Tools primarily for concept evaluation</td>
<td>Simulation and role playing</td>
<td>12.4.5</td>
<td></td>
</tr>
<tr>
<td>•</td>
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<td>Product personality profiling</td>
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12.1 TOOLS FOR IMMERSION AND WARM-UP

The main objective of these tools is to prepare the ground for the discussion session and, in particular, to help ensure that the participants are ready and able to contribute fully. This can be achieved in the following ways:

By preparing participants prior to the session, for example, by giving them some pre-session work to do so that they have a heightened awareness of the areas to be discussed, and bring with them relevant experiences from daily living.

By breaking the ice, or providing warm-up activities at the start of a session so that the participants become used to the idea of taking part right from the outset.

By getting the participants fully tuned in to the subject in question and actively thinking about the issues at the start of the session, prior to more detailed discussion or other activities.

There are no hard and fast rules for which of these tools should be used in a given application. The choice is highly dependent on the topic of interest and/or the participant types. Pre-meeting or 'homework' activities are good for making the best use of time in a discussion session, but if there is a high risk of participants not completing them, it might be better to plan a warm-up exercise for the start of a session instead.

12.1.1 Workbook

This is an example of a pre-meeting immersion tool, as described by Liz Sanders and Colin William (Chapter 10). The workbook is sent to the participants for completion prior to the discussion session. The act of completing the workbook helps the participants to take note of their experiences and thoughts about the topic of interest. It gives them time to tune in before the session.

The format and content of the workbook are dependent on the purpose of the session. Typically though, the book will contain different types of questions such as demographic details, opinions and information about things people own and use. This enables the researchers to find out more about participants, but without using up valuable time in the session.

The workbook can also include hands-on exercises, for example, keeping a diary or journal (see Section 12.1.2), or making a photographic record (see Section 12.1.3). These enable the participants to think about the issues to be discussed and about their own experiences in advance of the session. If exercises are included, it is important to provide sufficient workspace and clear instructions. Also, the exercises need to be as interesting as possible to increase the chance of people completing them.

The completed book can be brought to the session, or mailed back in advance. If sent back in advance, the researchers have more time to use the information to help plan the session, for example, develop more relevant follow up questions. The workbooks can be used within the session as the basis of an activity to stimulate discussion, for example, asking participants to present the answers they have given to some of the exercises. Alternatively, individual participants can use their books as a memory aid during the session.

Main advantages:
• participants have the opportunity to tune in to the topic in advance of the session;
• workbooks can be used to stimulate discussion or act as a memory aid;
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- makes effective use of time in the discussion session. Information not suited for discussion can be captured outside of the discussion time;
- a considerable amount of data can be captured for subsequent analysis if required.

Main disadvantages:
- time required by researchers to prepare and distribute the workbooks;
- relies on participants completing the workbooks. If they are not completed, the effectiveness of the session may be reduced.

12.1.2 Diary/journal

Diaries and journals can be valuable pre-meeting immersion activities. They may be included as part of a workbook exercise (see Section 12.1.1) and possibly be linked with making a photographic record too (see Section 12.1.3). Keeping a record of their actual activities in a given day, whilst carrying out certain tasks or using a product or system helps people to become immersed in the experience. It can also attune them to details of those activities that they normally take for granted.

In Chapter 8, Peter Coughlan and Aaron Sklar describe a project on mini-van interiors where they asked participants to keep a driving log for three days prior to the session. This included notes of trips they went on, who rode with them, the destination, how well the vehicle served their needs and their emotional state during each trip. The participants brought the journals to the discussion session where the notes and records served as prompts to their earlier experiences.

If sent back in advance, the information in participants' diaries/journals can be used to help plan the session and prepare questions. They can also be used in activities within the session, for example, asking participants to describe their actual experiences and emotions on a given day. The diaries/journals can also be used as a memory aid for participants during the session.

Main advantages:
- participants have the opportunity to tune in to the topic in advance of the session and are prepared for the discussion;
- diary/journal notes can be used to stimulate discussion or act as a memory aid;
- a great deal of information can be captured for subsequent analysis if required.

Main disadvantages:
- relies on participants completing the diaries or journals. If they are not completed, the effectiveness of the session may be reduced;
- some participants might not find writing easy or be comfortable writing;
- some participants may leave completion of the diary/journal until just before the session, thus limiting effectiveness and accuracy.

12.1.3 Photographic Record

The use of photographs adds a level of richness to purely text-based methods for recording information. A picture of a workspace can give deeper insights into the ways that people organise themselves, the ways they work and the things they use. Workbooks (see Section 12.1.1) and diaries/journals (see Section 12.1.2) can be greatly enhanced by
giving people cameras to document their experiences. The resulting pictures can be mounted in the workbook or diary along with their notes.

If people are given cameras in advance of the session, they can take pictures to record snapshots of their experiences, objects and surroundings related to the topic of interest. The pictures help people to remember things once away from the actual setting. Or they can be used to prompt discussion during the session. Images brought in by one participant can help others to understand and respond to their points of view. If sent back to the researcher in advance, the pictures provided by the participants can also be used to help in the planning of a discussion session, for example, formulating questions.

There are some practical issues concerned with the use of cameras. Each participant will probably need to be provided with a camera. Disposable cameras are a relatively inexpensive option, and they are small and neat to carry. Time is required for film processing however. Polaroid cameras and film are much more expensive, but they allow people to take and evaluate pictures on the spot. They can also annotate them immediately if required.

Main advantages:

- participants have the opportunity to tune in to the topic in advance of the session;
- relatively quick and easy thing for people to do;
- pictures can be used to stimulate discussion or act as a memory aid.

Main disadvantages:

- relies on participants taking the pictures. If participants fail to do this, it may limit the effectiveness of the session;
- cameras have to be provided to some or all of the participants. This adds to the expense and organisational costs;
- time is required for film processing if disposable cameras are used.

12.1.4 Video Record

This technique uses a video recording as a discussion stimulus, for example, to explore work processes. The video recording is shown to the whole group whilst the person using the system describes what is going on, including any comments on problems and good features. The exercise focuses participants on the issues in question, and provides a useful stimulus to subsequent discussion. It can also serve as the basis for more detailed analysis of the problems and subsequent identification of potential solutions.

This method has been used to analyse workplace problems (Kourinka, 1997, refers to the technique as autoconfrontation) and clearly has potential for use with a wide range of topic areas. These include product usability and human computer interfaces. Video recordings of user trials, for example, can be used to stimulate discussion during a group feedback session.

The main drawback with the method is the time required to make and edit/compile the video recordings. This would generally need to be done by the researcher to ensure quality and consistency. Some topic areas may be hard to capture on video, for example, experiences whilst travelling.

Main advantages:

- provides strong focus and stimulus for discussion and probing;
- brings real-world context into the session.
Main disadvantages:

- time and effort required by researchers to make video recordings;
- may be inappropriate or impractical for some topic areas.

12.1.5 ‘Day-in-the-Life’ Exercise

In such exercises, people outline their typical day, either for specific aspects (for example, use of computers, travelling, work tasks) or more generally. In cases where pre-meeting immersion tools such as diaries or journals (see Section 12.1.2) are impractical, a ‘day-in-the-life’ exercise is a good way of stimulating participants at the start of a session. Ede (1999) used the technique to learn more about the real activities of systems administrators in focus groups set up to study work practice.

It is helpful if people are given the opportunity to think quietly by themselves and make notes prior to presenting their typical day to the other participants. It is sometimes possible to ask people to produce simple time-line diagrams as shown in Figure 12.1. In her study, Ede co-opted other group members to write down on note cards each different activity as it was mentioned. These were then sorted and discussed later on in the session.

![Figure 12.1 Time-line diagram for a mail delivery (courtesy of Royal Mail)](image)

By carrying out the exercise, individuals are required to focus on the area of interest, reminding them of some of their real world experiences, which can then help stimulate the discussion. The time-line of events also provides a framework for people to explain their experiences and the emotions attached to them. ‘Day-in-the-life’ exercises act as valuable warm-up exercises to help people to become at ease with the discussion session environment and to get them involved.
Main advantages:
- no pre-work required from participants or researchers;
- quick and easy exercise for people to do;
- valuable warm-up exercise to help make people at ease and to get them involved;
- provides a stimulus for discussion and probing.

Main disadvantages:
- the descriptions may not be accurate;
- participants may wish to keep some details private;
- participants may disregard and omit details that they think are unimportant, but which may be critical.

12.1.6 Bring an Object

By bringing an object along with them to a focus group session, participants are encouraged to reveal some of their preferences, discuss their personal possessions or represent their everyday behaviours. Peter Coughlan and Aaron Sklar provide examples in Chapter 8.

In the first, a session facilitated for a toy manufacturer, children and parents were asked to bring their favourite toys. The discussion began with everyone explaining why they brought that particular toy. As the participants showed the toys to the group, the researchers were able to learn more about the roles of toys in their lives and what they valued about them. In the second example, a project about handheld devices, participants were asked to bring in an object they thought was pleasant to hold. This allowed the researchers to learn what values would apply when the participants assessed the handheld prototypes they would be shown later in the session.

As with photographic records (see Section 12.1.3), using objects as a focus for discussion provides an excellent mechanism for allowing researchers to learn more about the participants’ behaviours, emotions and opinions. Such exercises also help people to become at ease with the discussion session environment and to get them involved.

Main advantages:
- minimal pre-work required from participants;
- good warm-up exercise to help make people at ease and to get them involved;
- provides a focus for gaining deeper insights into individuals’ emotions and opinions.

Main disadvantages:
- relies on participants bringing objects. The effectiveness of the session may be limited if this is not done;
- some individuals might feel exposed or feel that they will reveal too much of themselves by bringing an object from home.

12.1.7 Collages and Mood Boards

Although there may be subtle differences between collages and mood boards, their use in the context of group discussions is similar. For the purposes of this section, therefore, they are treated as the same thing.
The main function of collages and mood boards is to enable people to articulate their experiences and feelings through pictures and words. They transcend linguistic limitations, overcoming the relatively narrow scope of words. For some individuals, it is easier to communicate their thoughts using pictures, and they may be more willing or able to put together a collage than write things down. Such techniques work well with children for these reasons. Other benefits of collages and mood boards include:

- the act of putting together a collage or mood board helps activate feelings and memories;
- people can use them to explore and express their dreams and aspirations;
- the completed collages and mood boards provide valuable stimuli for discussion amongst the participants, and probing by the moderator (see also association, Section 12.4.7);
- when the session is over, the outputs can be used to help present findings to clients or to provide designers with sources of inspiration.

McDonagh et al. (2002) used mood boards in their study to explore the essence of play with regard to the design of playground equipment. In participative workshops, children were given a diverse set of images. They were asked to select those that represented play and assemble them on a sheet of paper (see Figure 12.2). They were also asked to provide a brief explanation of their creations, and the reasons for choosing each image. The results showed a high degree of symbolism, and particular 'triggers' from their personal experiences and memories were expressed. For example, play was expressed by many of the children as a social activity.

The basic requirements for a collage or mood board exercise are simple - all that is needed is a set of pictures and words (typically between 50 and 100), and a space on which to stick them down. In some cases, it can be helpful to provide samples of materials and textures too. A simple way of providing materials for the participants is to
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print the images and words on sheets and provide scissors and glue for the participants to cut out and stick down for themselves. It is much easier and quicker for participants though if they can be given pre-prepared sticker sheets. In Chapter 10, Liz Sanders and Colin William describe how to create a collage kit.

Main advantages:

- transcends limitations of words by using images as primary method for articulating thoughts. Suitable for use with children;
- activates participants' feelings and memories during production and enables them to express dreams and aspirations;
- provides a stimulus for discussion and probing;
- outputs can be used to help present findings and to provide inspiration for designers.

Main disadvantages:

- requires thorough preparation;
- requires reasonable amount of time in the session to create the collages (typically a minimum of 15 minutes);
- unfamiliar exercise that may be uncomfortable for some participants. Clear briefing and some assistance from the moderator may also be required.

12.1.8 Cognitive Maps

Cognitive mapping provides insights into the underlying cognitive structures that people have. It enables better understanding of how individuals think about complex phenomena. When they create a cognitive map, participants plot out their understanding of systems and how things fit together or relate to each other. Symbols, shapes and sometimes words are used to show connections, clusters or hierarchies of concepts. There are no conventions or rules – individuals use the representations that work best for them.

As with collages or mood boards (see Section 12.1.7), the method is predominantly visual in nature, and encourages participants to express thoughts and ideas without being limited by language. When they have made their maps, the participants are asked to explain them. This provides opportunities for others to join the discussion and the moderator to probe further. The technique can be used to help individuals describe current scenarios. For example:

- how a process or system works (or how the participant thinks it works);
- how a person understands an event;
- how a person makes decisions about an issue.

It can, however, also be used as a creative tool, allowing participants to explore and express ideas for how they would like things to work in the future. Completed maps provide helpful stimuli for group discussion and the exploration of concepts. They also provide useful aids for presenting outputs to stakeholders such as clients, or inspiration for designers.

Creation of a cognitive map requires coloured pens, a set of symbols and words, and somewhere to stick them down (see Figure 12.3). As with collages or mood boards, the symbols and words can be pre-printed on sheets for the participants to cut out and stick down for themselves, or provided on sticker sheets. Many pre-prepared symbols and shapes are readily available from art and craft stores. In Chapter 10, Liz Sanders and Colin William describe how to create a cognitive mapping kit.
Main advantages:
• transcends limitations of words by using shapes and spatial layouts to help articulate thoughts, and aid understanding of underlying cognitive structures;
• provides a stimulus for discussion and probing;
• provides a vehicle for generating design ideas;
• outputs can be used to help present findings and to provide inspiration for designers when creating new concepts.

Main disadvantages:
• requires thorough preparation;
• requires time in the session to create the maps (typically a minimum of 15 minutes);
• unfamiliar exercise that may be uncomfortable for some participants. Clear briefing and some assistance from the moderator may also be required.

12.1.9 Round-robin Questionnaire

The round-robin questionnaire is a relatively simple technique for getting participants involved in the session and focused on key issues right from the start. In some circumstances, it also enables problem areas to be analysed, and potential solutions to be identified.
The technique involves a series of blank sheets of paper with an open-ended statement on the top. The statements used must be tailored to the topic of the discussion. Some examples are shown below:

The hardest part of my job is...
The design change that would most improve my workstation is...
The best piece of equipment I use in my job is... because...
The worst piece of equipment I use in my job is... because...
The thing I like best about working in my company is...
The thing I like least about working in my company is...

Ideally there should be as many sheets/statements as there are participants, but a small mismatch is acceptable. One sheet is issued to each participant, and all spend a minute or two completing the statement in the way they think most appropriate. When everyone is ready, the sheets are passed on to the person sitting to one side, so that everyone has a new statement to complete, following on from the answers given previously. This is repeated until all participants have completed all the statements (see Figure 12.4), typically ten to fifteen minutes.

Figure 12.4 A completed round-robin questionnaire from a focus group held to assess a data entry task

Whilst completing the sheets, individuals can draw inspiration from the answers that others have given previously if they wish. Sometimes a person will find that someone else has already given the answer they would have chosen, in which case they should give their second (or third) choice answers to avoid repetition. In this way, when the exercise is complete, a wide range of issues will have been identified.

The completed sheets have two main uses. Firstly, they provide a written record for later analysis if required. Secondly, and more importantly, they can be used as the basis for a discussion session, enabling participants to elaborate on the answers given. For this reason, it is sometimes useful to use flip-chart size paper for the sheets, with answers written using bold markers so that everyone can easily view the sheets when they are attached to a wall or easel.
Main advantages:

- no pre-work required from participants;
- minimal preparation for researchers;
- valuable warm-up exercise to help participants relax and to get them involved;
- provides stimulus for discussion and probing;
- provides written record for subsequent analysis if required.

Main disadvantages:

- consumes time during the session;
- some participants may feel they are being 'pressured' to contribute;
- some participants may find the exercise difficult to complete.

12.1.10 Thought Bubbles

This is a quick and simple way of engaging the participants in the topic of interest at the start of a session. The technique works by getting individuals to place themselves in the shoes of a person in a given situation related to the topic of interest. A simple drawing or image of the scenario is given to, or shown to, the participants and they are asked to write down what might be going through the mind of the person involved (see Figure 12.5).

![Thought bubble exercise from a focus group on alarm panel design](image)

In this example, the focus group workshop was held to understand the sorts of problems individuals have when setting, unseting and programming intruder alarms.
Scenarios shown in the thought bubble diagrams in this case included related scenarios (using a video recorder and a bank cash point or ATM) as well as the actual scenario in question.

The exercise is relatively quick to set up and can be run at the start of a session to help participants to focus on the topic of interest. The outputs can be used to stimulate discussion and can also provide a source of material for subsequent analysis or when reporting results.

Main advantages:
- no pre-work required from participants;
- relatively uncomplicated exercise to do;
- useful warm-up exercise to help participants relax and to get them involved;
- provides stimulus for discussion and probing.

Main disadvantages:
- consumes time during the session;
- participants may be unfamiliar with the approach;
- the variety of responses can be limited.

12.1.11 Word Map

Used by O’Brien (1981) and Wilson (1991), a word map is a tool that helps participants focus on the topic of interest at the start of a session, and to understand the main linkages between them. It is similar to mind mapping (Buzan and Buzan, 1993) but adapted for use in group sessions.

![Figure 12.6 Part of a simple word map (from Wilson, 1991)](image-url)
With O'Brien's technique, each person in turn is asked by the moderator to volunteer a single word relating to the topic in question. These can be written directly onto a flip-chart, or written on cards, or post-it notes and attached to a wall or display board. In a second round, the participants are asked to provide secondary words, linked in some way to a word that has already been put up. These are also attached to the wall, alongside the primary word, or linked with a line. The process continues until the supply of relevant words is exhausted. The end result is a word map showing key areas of the topic and their relationships (Figure 12.6).

As a variation, participants can volunteer the words at random, with no attempt to record any linkages. This is similar in many ways to a brainstorming session (see Section 2.3.1).

The exercise is relatively quick to set up and run. If done at the start of a session, the outputs can be used to stimulate discussion or, in a more formal way, to create an agenda. They can also be used as a source of information for subsequent analysis if required.

Main advantages:
- no pre-work required from participants;
- creates a common understanding of issues and their relationships;
- useful warm-up exercise to help participants relax and to get them involved.

Main disadvantages:
- consumes time during the session;
- some participants may feel 'pressured' to contribute;
- requires a skilled moderator to help organise and manage the inputs.

12.2 PROBLEM ANALYSIS

The techniques described here are relatively uncomplicated analytical tools that can be used in the context of a group discussion. They can be used to help understand a problem and deconstruct it so that the key elements and the linkages between them can be better understood. Several of the techniques described here are not specific to ergonomics or design, and have been adapted from other, more general tools used in management. Such techniques are unlikely to be employed in discussion sessions aimed at learning about what participants think and feel about consumer products or services. They are, however, well suited to participatory design problems where users, operators or other stakeholders are solving problems concerning workplaces, systems or equipment for their own use.

12.2.1 Cause and Effect Analysis

This is a systematic way of looking at cause and effect, either for understanding the causes of a problem, or for identifying what needs to be carried out to achieve a desired effect. The analysis is carried out using cause and effect diagrams, which are sometimes called ‘fishbones’ or ‘Ishikawa diagrams’ after their inventor (see Higgins, 1994). The basic procedure for carrying out cause and effect analysis is as follows.

Carry out a brainstorming session (see Section 12.3.1) to identify the causes that might lead to the effect under analysis.
Group the results of the brainstorming session under common main headings or themes. With the lamp example (Figure 12.7), 'power failure', 'no house current' and 'wall switch turned off' are all causes linked to 'power'. Organise causes under further sub-groupings where required, for example, 'power failure' may be caused by a storm or power plant failure.

Create the fishbone diagram as shown in Figure 12.7 using the side 'bones' for main headings and marking the main causes and sub-causes alongside these.

Review the diagram adding further causes or re-organising them as required.

Prioritise causes identifying the most important for further investigation or action as required.

No analysis should take place in the early stages (the brainstorming phase). During this phase, participants should be encouraged to mention as many ideas as possible. It is only after the initial idea generation that analysis should take place, i.e. testing the understanding of the ideas, grouping, combination and prioritisation. There is no cut-off point for new ideas to be added; it is likely that the construction of the diagram will trigger new thoughts in itself.

It is important that all participants can see the diagram when it is constructed, so large charts and large writing are likely to be required. It may be helpful to transfer the
causes onto cards or post-it notes that can be placed onto a wall display. For complex problems, diagrams can become unwieldy to work with. In these cases, one or more of the side bones can be removed and dealt with separately as fishbones in their own right.

The technique is not limited to the analysis of existing problems. For the design of a new system, for example, it can be used to help understand the key things that need to be in place to ensure a satisfactory outcome. In other words, the effect is the desired end-state and the causes are the actions or functions needed to achieve this. The potential application areas are wide ranging, including work systems design, organisation design, marketing strategies, project planning and identification of system requirements.

Main advantages:

- uncomplicated but powerful analytical technique to identify key issues affecting a problem and to understand the linkages between these;
- harnesses the collective knowledge and skills of the participants;
- not limited to the analysis of existing problems – can be used to identify ways of achieving the desired end-state in wide range of application areas.

Main disadvantages:

- requires a skilled moderator to help organise the inputs;
- participants may be unfamiliar with the method;
- can be time-consuming.

12.2.2 Why-why Diagram

<table>
<thead>
<tr>
<th>Problem</th>
<th>WHY?</th>
<th>WHY?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamp does not work</td>
<td>No power to building</td>
<td>Lines down</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cut off by supplier</td>
</tr>
<tr>
<td></td>
<td>No power to lamp</td>
<td>Lamp not plugged in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Socket not switched on</td>
</tr>
<tr>
<td></td>
<td>Bulb failure</td>
<td>Missing bulb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broken bulb</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose bulb</td>
</tr>
<tr>
<td>Failure in power cord</td>
<td>Failure in bulb holder</td>
<td>Fuse blown in plug</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose wire in plug</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wire broken</td>
</tr>
<tr>
<td>Failure in bulb holder</td>
<td>Failure in switch</td>
<td>Damaged bulb holder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose wire in holder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broken switch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Corroded contacts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loose wire in switch</td>
</tr>
</tbody>
</table>

Figure 12.8 Example why-why diagram
This is a variation on cause and effect analysis (see Section 12.2.1). Why-why diagrams explore the reasons why a particular problem may be occurring by asking the question 'why?' and progressively re-describing causes at greater levels of detail (see Figure 12.8).

A variation of this method can be used in reverse to explore ways of solving problems. This is the how-how diagram described in Section 12.3.3.

Main advantages:
- uncomplicated but powerful analytical technique to identify key issues affecting a problem and to understand the linkages between these issues;
- harnesses the collective knowledge and skills of the participants.

Main disadvantages:
- requires a skilled moderator to help organise the inputs;
- participants may be unfamiliar with the method;
- can be time-consuming.

12.2.3 Force Field Analysis

Force field analysis helps identify the factors that help or hinder the achievement of a task or other desirable outcome, for example, achieving production or quality targets, or implementing a new system. Identification and subsequent manipulation of these factors can help close the gap between the current state and the desired end-state. This can be a useful technique for participatory design projects.

The basic procedure for carrying out a force field analysis is as follows.

Create the chart. As shown in Figure 12.9, draw vertical lines on a flip-chart, one down the centre (to represent current state) and one to the right (desired end-state).

Identify helpers and hinderers. Use a brainstorming session (see Section 12.3.1) to list the helping and hindering factors or forces and write these on the sheet — helpers to the left and hinderers to the right.

Estimate the relative strengths of the forces. Mark them on the flip-chart sheet either as scores (e.g. 1 is weak, 5 is strong) or as arrows with different lengths (e.g., short arrow is weak, long arrow is strong).

When the analysis is complete, the group can then use the information to generate potential actions by considering how to increase the number and strength of helping forces, and vice versa for the hindering ones.

The technique helps key issues to be identified, and prioritised for action. It is a valuable tool to aid planning, and as such has many potential uses within participatory design in the workplace. It also has potential application outside of this in understanding the views of consumers regarding the factors affecting the successful introduction, use or uptake of a new service. It is not suited to the exploration of design details relating to products or systems.

Main advantages:
- uncomplicated but powerful analytical technique to identify and estimate the strength of key factors affecting achievement of a desired outcome;
- can be used both for planning and for post-implementation analysis purposes.
Main disadvantages:
- limited use for consumer products or services;
- not suited to exploration of design details for products or systems.

<table>
<thead>
<tr>
<th>Where we are:</th>
<th>Where we want to be:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helping</td>
<td>Hindering</td>
</tr>
<tr>
<td>Outdated</td>
<td>New computerised</td>
</tr>
<tr>
<td>production</td>
<td>system ready</td>
</tr>
<tr>
<td>system</td>
<td></td>
</tr>
</tbody>
</table>

- Business policy. Top management fully supports change
- Technology is proven
- Morale in workplace generally high

- Some local managers not fully in support
- Concerns over reliability of system
- Fear of job losses
- Concerns that current workplace unsuitable for the new equipment
- People worried that they will not be able to understand new system

Figure 12.9 Example force field analysis

12.3 IDEA GENERATION AND DEVELOPMENT

This section describes tools that are designed to enable the creation of new ideas and/or development of these. It is common for these to follow on from some form of immersion, warm-up or problem analysis activity so that people are mentally prepared for creative work.

The striking feature of these techniques is that many of them involve the use of ‘hands-on’ activities. These allow people to visualise their ideas by making things, including drawings, collages or models. In Chapter 10, Liz Sanders and Colin William describe how these types of techniques help *bisociation* and *expression* – i.e. the bringing together of elements in a new way, and then expressing those new ideas for others to see and understand.

The generation of ideas is linked closely with the assessment or evaluation of them. Typically the ground rules of any idea generation method require people to abstain from criticism or rational assessment during the creative phase. Once the creative phase has been completed, the outputs lend themselves to scrutiny from others, and this can again lead to the development of further new ideas.

One of the methods in this section (see Section 12.3.2 Nominal Group Technique) incorporates concept assessment within it. Other assessment methods are, however, described in Section 12.4 – Concept Evaluation.

12.3.1 Brainstorming
Brainstorming is an idea-generating technique that is relatively quick and easy to use. Participants in the session call out ideas so that each person has the opportunity to build on the thoughts of others. The ideas are written down on a flip-chart by the moderator/facilitator as they are called out. Brainstorming is often an integral part of other group techniques, for instance, Cause and Effect Analysis (see Section 12.2.1) and Nominal Group Technique (see Section 12.3.2). Typically, brainstorming sessions last for no more than 30-40 minutes, and are often much shorter.

The moderator/facilitator describes the problem or situation for which the ideas are sought and ensures that everyone understands the objectives. The brainstorming itself can then take place. There are different ways of running brainstorming sessions. These include:

- group members call out their ideas spontaneously. This is the most familiar brainstorming method;
- the facilitator/moderator asks each group member in turn for a suggestion. If during a round a group member does not have an idea to offer, they can ‘pass’ until the next round (silences during sessions are allowed – they enable participants to think);
- group members spend a short time (approximately five minutes) writing down their ideas. The facilitator/moderator then asks each person in turn to read out one of their ideas, continuing round the table until all have been presented;
- group members spend five minutes writing their ideas down on paper. They then pass the sheet onto the person sitting beside them. All participants continue writing ideas, using previous suggestions in the lists as inspiration. The process is repeated until the sheets have passed around everybody, or when there are no new ideas. This is sometimes called brainwriting (Higgins, 1994);
- ideas are submitted on note-cards rather than called out. This enables inputs to be more easily sorted or categorised as required.

Whichever method is used, it is important that all taking part understand the basic rules of brainstorming to help create an informal atmosphere where participants feel unconstrained. There are many variations to these rules, but they can be summarised as follows:

- Do not evaluate or criticise ideas during the session.
- Encourage wild or seemingly irrelevant ideas.
- Build on the ideas of others.
- Strive for quantity.

There are many ways to encourage and enable participants to be creative during brainstorming sessions. These are explored at length in Higgins (1994) and Clegg and Birch (1999). A selection of these techniques is summarised below.

**Inverse brainstorming.** Instead of generating ideas for how to solve the problem, think of ways to make it worse. This can bring a fresh perspective from which real ideas for solutions can emerge.

**Analogy.** Identify some of the needs of the topic of the brainstorming session, then identify some examples of these needs in other areas. These areas are not restricted to products or systems – they could be industries, sports, animals and so on. Then identify the ways that these might provide direct solutions, or use them as a springboard for more abstract thinking.

**'It's silly' brainstorming.** The only criterion for this is that the ideas must be lateral. Anything remotely rational must be discounted. From the list of outrageous suggestions, there may be a foundation for a novel but workable solution.
Ignore physics. This is a useful technique for product development. When creating ideas, ignore the constraints of a fundamental law of physics. This may lead to the identification of solution concepts that can subsequently be made to work with appropriate development.

Word association. When inspiration is lacking, it can be helpful to generate words apparently at random so that new connections can be made, possibly leading to new solutions. A common way of doing this is to pick a word at random (using a dictionary or similar source) as a starter. The group members then call out words associated with the starter word. These can then be related back to the problem at the end to explore possible solutions. As a variation, words which 'pop out' by themselves with no apparent relationship to the starter word can be used.

Brainstorming is undoubtedly a quick and effective way of harnessing the creativity of the participants, and exploits the synergistic effects that occur when people are brought together for group discussions. To be successful, however, the group members have to participate fully. The outcomes will be disappointing if individuals feel constrained in any way. In situations where group members may not be fully at ease, it is wise to leave brainstorming until later in the session, perhaps following on from one of the immersion and warm-up activities described in Section 12.1.

Main advantages:
- relatively uncomplicated technique;
- requires little pre-preparation work;
- generates ideas quickly.

Main disadvantages:
- requires full participation from all group members;
- will not work well unless an informal atmosphere is created first;
- not necessarily exhaustive.

12.3.2 Nominal Group Technique

Nominal group technique is a structured process for generating ideas and producing immediate results in the shape of a list of rated priorities. It is suitable for groups of between six and twelve people. The procedure (from Higgins, 1994) is as follows.

Generation of ideas. Participants are given a specified time (usually five to ten minutes) to write down their ideas in response to the stated problem.

Recording of ideas. The facilitator/moderator asks participants to read out their ideas in turn, one idea at a time, and writes these on a board or flip-chart. This continues in a round-robin fashion until all the different ideas have been read out – duplications of the same idea should not be added to the list. Asking for contributions in turn in this way de-personalises them and helps emphasise equality of ideas.

Clarification of ideas. Each idea in the list is briefly discussed so that everyone understands what it is. The purpose of this step is to ensure that everyone knows what the choices are, and is not to be used as an opportunity to sell the ideas to others.

Voting on ideas. The purpose of this stage is to narrow down the list of ideas and prioritise them. This is done using a ballot process. There are several ways of managing
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this but, commonly, the participants are asked to write on a card their top five choices (in order of preference) and hand it to the facilitator/moderator. The results can then be tabulated to show the total number of votes each idea has received and the ranking scores. Ranking scores are determined by using a 1 to 5 scoring system; 5 points being awarded to an idea whenever it is ranked top. If necessary, the voting process can be repeated to further refine the output, but on the second iteration people should be asked to write down just their top three ideas. On the second iteration, ranking scores are determined using a 1 to 3 scoring system.

The use of a structured approach, especially the incorporation of a voting system, is attractive because it ends with some form of result, which is often satisfying for participants. For some participatory design projects, particularly those where the group has decision-making authority, formal outputs such as this may be a key requirement so that an audit trail is created.

Main advantages:

- requires little pre-preparation work;
- process encourages all to take part;
- minimises impact of dominant group members;
- produces a tangible output, i.e. a prioritised list of ideas or actions.

Main disadvantages:

- some participants may feel pressured to contribute;
- structure may be inhibiting;
- voting process takes up time during the session.

12.3.3 How–how Diagrams

This method is particularly useful for seeking ways of refining and implementing solutions to problems. It builds on other techniques described here (for example, Section 12.3.2 Nominal Group Technique) by taking the agreed solutions and then exploring the details for how to make them work.

How–how diagrams use the same principles as why–why diagrams (see Section 12.2.2), but in reverse. Starting with a high level statement of a possible solution, the methods for achieving the solution are progressively elaborated by continually asking the question ‘how?’ (see Figure 12.10).

Main advantages:

- uncomplicated but powerful technique to identify how an idea or solution can be developed and implemented;
- forces participants to think about practical issues of implementation;
- harnesses the collective knowledge and skills of the participants.
Main disadvantages:

- focus on implementation and practicality may reduce creativity;
- less suited to focus groups with consumers, who may be unfamiliar with the method.

<table>
<thead>
<tr>
<th>Objective</th>
<th>HOW?</th>
<th>HOW?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make it easier to replace the cartridge</td>
<td>Make it easier for user to find the cartridge</td>
<td>Give clear instructions on the display</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide a mimic diagram on the display</td>
</tr>
<tr>
<td></td>
<td>Make it easier to remove the old cartridge</td>
<td>Clearly label the cartridge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Colour code the cartridge</td>
</tr>
<tr>
<td></td>
<td>Ensure user removes locking tag</td>
<td>Redesign tag so cartridge cannot be fitted with it on</td>
</tr>
<tr>
<td></td>
<td>Ensure the user does not fit the cartridge upside down</td>
<td>Provide a big warning label</td>
</tr>
<tr>
<td></td>
<td>Make sure new cartridge locates correctly</td>
<td>Change design of runners so that cartridge is guided into place</td>
</tr>
<tr>
<td></td>
<td>Provide a better user guide</td>
<td>Provide a noticeable 'click' so they know it is in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduce detail in the graphics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use colour</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number each step</td>
</tr>
</tbody>
</table>

Figure 12.10 Example how-how diagram

12.3.4 Drawing

Drawing can be an extremely versatile and powerful way of enabling individuals to generate and communicate ideas. When people draw their ideas, the outputs often contain details and concepts that are not easily described verbally. Sometimes they contain information that the participants have taken for granted and have not thought worthy of mention as part of the discussion. The completed drawings are a valuable stimulus for further discussion and elaboration or development of ideas. They are also extremely helpful when presenting findings to clients, or to support designers with subsequent product or system development. Drawing activities are fun, stimulating and thought provoking.
Drawing exercises can be carried out with people working individually or together in small groups. They can be used in many different ways and for different purposes. For example, in a session on kettle design, participants could be asked to draw their ‘ultimate’ (future) kettle. In a session looking at improving a workplace, people could be asked to create two drawings, one of their existing workplace (helping to define the main problem areas) and the second to show how it might be re-designed. For a website, people could be asked to draw out a chart showing the key chunks of information and the links and hierarchies between them. Any type of drawing or representation can be used, including plans, 3D sketches, computer screen layout designs or charts. It is often helpful if the participants add their own personal comments to the drawings to highlight key features (see Figure 12.11).

![Figure 12.11 Users’ ideas for a new type of travelling post office (from Rainbird and Langford, 1998)](image)

The only materials required for drawing exercises are drawing media and surfaces (paper and pens). Large sheets of paper (up to flip-chart size) take up space on the table, but provide space to enable drawings to develop. They are also easier for people to see from a distance during feedback or subsequent discussion. It is helpful to provide several pens and pencils in a variety of colours. This allows people to make their drawings clearer and more informative by highlighting different features and using colour coding where required.

To get the best from drawing exercises, participants need to be focused on the issues under discussion and also to be fully settled in. It is usually best to schedule such exercises later in the session after some of the other activities have taken place, for example, one of the immersion and warm-up techniques described in Section 12.1. It is also helpful to provide a briefing for the activity to ensure participants know what the
objectives are, and also the constraints (if any). In some cases, it can also be helpful to
remind people of the key issues to consider, for example, types of user, types of use and
features required. For more complex tasks, it is helpful to write the briefing down. Often,
the participants will be unfamiliar with this type of activity, so it is important to make
them feel at ease, for example, by reassuring them and advising them not to worry about
the quality of their drawing skills, or whether their annotations are spelt correctly.

It can be useful in some cases to issue slightly different briefings to individuals or
groups. For example, some individuals could be asked to draw solutions taking account
of constraints such as cost or technical feasibility, whereas others could be asked to take a
‘blue sky’ approach.

The time required for drawing activities is dependent on the complexity of the task
set and the desired outcomes. In some cases, time may be limited to five or ten minutes to
ensure that participants concentrate on just the key features. In other cases, it is better to
provide more time (up to about 45 minutes) to allow ideas to be explored and developed.

Main advantages:
- relatively uncomplicated and straightforward – requires minimal pre-preparation;
- transcends limitations of words by using drawings to help articulate thoughts and
  ideas;
- provides a stimulus for subsequent discussion and probing – acts as a vehicle for
  generating more specific information and design ideas;
- outputs can be used to help present findings and to provide design rich data for
  designers.

Main disadvantages:
- requires reasonable amount of time in the session to complete the activity (typically
  between 5 and 45 minutes);
- unfamiliar exercise – may be uncomfortable for some participants. Clear briefing and
  some assistance from the moderator/facilitator may also be required.

12.3.5 On-line Illustrator

The use of an on-line illustrator is a variation to drawing (see 12.3.4). A professional
artist, illustrator or designer can rapidly translate spoken thoughts into sketches, thus
visualising the ideas on behalf of the creators. Once created, the drawings can then form
the focus for the development of the basic ideas, leading to improvement, or to
completely new ideas. O’Brien (1981) used this method as part of his Shared Experience
Events. A similar technique was used by industrial designers Seymour Powell during the
television series Better by Design (Channel 4, 2000).

The originators of the ideas may perceive that they lose control to some extent
because the realisation of their thoughts is in the hands of someone else. However, the
whole group can contribute more easily to the development of the idea as the picture
gradually builds up. Also, participants are not constrained by their limitations as artists,
or lack of confidence due to a perceived lack of drawing skills.

Main advantages:
- transcends limitations of words by using drawings to help articulate thoughts and
  ideas;
- some participants may be more comfortable with a third party doing the drawing;
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- provides a stimulus for the development of ideas by the whole group;
- outputs can be used to help present findings and to provide inspiration for designers.

Main disadvantages:
- requires reasonable amount of time in the session to complete the activity (typically between 5 and 45 minutes);
- some individuals may not be able to contribute to the development of the ideas;
- additional cost of hiring an illustrator.

12.3.6 Storytelling

Storytelling is a method for presenting ideas. Participants are given a problem to solve, as they might be with a drawing exercise, but are asked to present their ideas in the context of a short story. This provides context and brings the ideas to life. There are some similarities to scenario-based discussion (see Section 12.4.1) and simulation/role-playing (see Section 12.4.5).

Kuhn (2000) describes a study where focus groups were a key part of the development of requirements for a home automation system. As part of this, participants were asked to develop ideas for how particular features of the system could be useful and how they could work. These features included time scheduling, shopping lists, reminders and regulation of the heating system. Small groups of participants were given a clear briefing of what they had to achieve and were asked to work out and present two or three ideas in the form of a short story.

Main advantages:
- relatively uncomplicated - requires minimal pre-preparation;
- provides a context for the explanation and increases understanding of ideas;
- provides a stimulus for subsequent discussion and probing;
- outputs can be used to help present findings and to provide inspiration for designers.

Main disadvantages:
- requires considerable amount of time in the session to complete the activity;
- unfamiliar exercise – may be uncomfortable for some participants. Clear briefing and some assistance from the moderator/facilitator may also be required.

12.3.7 Two-dimensional (Layout) Modelling

Two-dimensional modelling involves the positioning of objects on a flat surface to explore and test ideas for design problems primarily concerned with layout. Examples where this type of approach is applicable include:
- floor layouts for buildings or workplaces;
- layouts of equipment on workstations;
- placement of the key elements in a vehicle cockpit;
- positioning of controls and displays on an instrument panel;
- positioning of information on display screens or panels.

Layout models allow many issues to be tested. With buildings and workplaces, for example, these include circulation space, product flows, access and people or vehicle
movements. For workstations, issues such as vision, reach and space can be assessed. For display and control applications, issues such as grouping of information elements and sequence of use can be explored.

Because it is relatively quick and easy to do, layout modelling may be used as a stepping stone prior to the further development of ideas in three dimensions. For example, a range of ideas for the positioning of features in a vehicle cockpit might be generated using layout modelling, enabling the best two or three to be identified for detailed development in three-dimensional mock-ups.

In some cases, layout modelling is best carried out in scale, for example, the positioning of rooms or areas in a building. In other cases, however, working in full scale is more helpful, for example, the placing of equipment on a workstation such as a supermarket checkout. Full-scale modelling of this nature is a relatively quick and simple way of bringing things to life for the participants.

Scale layout modelling can be done simply using paper or card cut-outs of the components (for example, equipment or workstations) and laying these out on paper or plans. As described in Snow et al. (1986), overhead projections of designs can also be used. For full-scale modelling, cut-outs can be laid out on the floor or on a large table – although care should be taken that the shape of the table does not constrain the designs. To aid visualisation and testing, it is sometimes more helpful to have simple three-dimensional card mock-ups of key items (Wilson, 1991). For example, with a supermarket checkout, this would include data entry keyboard, display panels, weighing scales, printer and cash drawer.

Within discussion sessions, layout modelling exercises are best carried out with people working in groups of two or three. Between 15 and 45 minutes are required, depending on the complexity of the task set. As with drawing exercises, participants should be warmed up and focused on the key issues prior to starting. Again, it is important to brief people properly. When the exercise is complete, the groups present their findings to the remainder of the participants, providing further stimulus for discussion and probing of issues.

Main advantages:
- useful for testing functional issues relating to workplaces, workstations and systems;
- intuitive activity – participants find it enjoyable, creative and interesting;
- layout models help visualise ideas and provide a stimulus for discussion and probing;
- quick method for idea generation and testing. Can be used as a stepping stone to eliminate poor ideas prior to further development in three dimensions;
- outputs can be used to help present findings and to provide inspiration for designers.

Main disadvantages:
- requires considerable amount of time in the session to complete the activity (typically between 15 and 45 minutes);
- full-scale layout modelling requires more space and materials;
- not useful for exploring emotional aspects of design such as appearance. Unlikely to be useful for consumer products.

12.3.8 Three-dimensional (Form) Modelling and Mock-ups

For some topic areas, three-dimensional modelling provides an excellent opportunity for people to express and to test their ideas. By building models and mock-ups people can:
generate and assess ideas for the three-dimensional form of a product;
assess issues relating to size, shape and comfort;
test ideas for positioning controls and/or displays on an object;
generate and assess ideas for positioning of items in three-dimensional spaces, for example, workstations or aircraft cockpits;
generate and test entire space layouts, for example, workstation layouts in a control room.

Three-dimensional modelling can be carried out at reduced or full scale. The choice will depend on the application and/or the facilities available. Smaller, handheld objects lend themselves readily to full-scale models, whereas larger sized projects such as vehicle cockpits require more space and materials. Where it is possible, however, using full-scale modelling of larger sized objects is beneficial as it allows participants to become part of the model and to carry out simple simulations or role playing exercises. The crane driver example in Chapter II is an example of this.

There is an almost limitless number of ways of constructing three-dimensional models. However, practicality is the key when designing modelling exercises to be carried out as part of group discussions. Issues to consider include the following.

Ease of use. It is important the method is intuitive for the participants and requires no special skills to use. To a certain extent, this is dependent on the types of people taking part. For example, use of nuts, bolts and simple tools may be acceptable for engineers or product designers, but not for some other user groups.

Speed of use. It must be possible for people to complete the exercise in a reasonable time – typically between 15 and 60 minutes depending on the application. There is no requirement for the outcomes to be sophisticated or finely detailed. The aim is simply to enable quick generation, development and/or testing of ideas.

Protection of participants. It is important to ensure that participants will not be harmed or their clothing damaged by the modelling materials or tools used. Again, this will be dependent to some extent on the types of people taking part. It may be necessary to provide some protective clothing and/or facilities for people to clean themselves up afterwards.

A selection of modelling methods that have been used within group discussion sessions is given below.

Clay modelling. This is useful for smaller scale objects and can be used to explore size, shape and form. Positioning of handles, controls and displays can also be incorporated. The medium is easily worked and does not constrain the users to any particular shapes or forms. Dolan et al. (1995) used clay modelling during their focus groups exploring designs of telephone handsets.

Velcro-modelling kits. Liz Sanders and Colin William describe these in Chapter 11. Such kits consist of a range of shapes, buttons and other items that can be quickly and easily stuck together to create objects. The components are deliberately ambiguous in form and purpose so people are not constrained in the ways they use them.

Cardboard modelling. Cardboard is an inexpensive and versatile material that can be easily cut to shape and taped together to create mock-ups. If required, support structures such as Dexion can be used. More detailed features can be added by simply drawing or sticking them on. Cardboard modelling is particularly suited to larger scale mock-ups such as workstations (e.g. Wilson, 1991) or vehicle cockpit mock-ups. Assistance may be required with some user groups, for example when cutting the card to shape.
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**Use of existing components.** With full-scale mock-ups it is sometimes possible to incorporate existing components such as seats, keyboards or control panels. Sometimes it is more effective to provide mock-ups or models of these components to reduce weight or minimise risk of damage. The integration of real components helps to add realism to the model and can help with the testing of concepts.

Main advantages:
- valuable for idea generation and testing, including visual appearance and three-dimensional form of objects;
- intuitive activity — participants find it enjoyable, creative and interesting;
- models help visualise ideas. With full-scale models, participants can carry out simple simulation exercises and gain a more realistic appreciation of key issues;
- provides a stimulus for subsequent discussion and probing;
- outputs can be used to help present findings and to provide inspiration for designers.

Main disadvantages:
- requires considerable amount of time in the session to complete the activity (typically between 15 and 60 minutes);
- requires appropriate materials and possibly tools and/or protective clothing. Participants may require skill and/or assistance using tools and materials;
- full-scale modelling requires more space.

**12.3.9 Design Decision Groups**

The primary use of Design Decision Groups is to facilitate the participation of individuals (e.g. users, consumers, customers and stakeholders) in the design of changes to the equipment and workplaces they use. They do this by incorporating a range of techniques such as word maps, drawing, discussion and modelling within a pre-determined structure or process. This leads the participants through various phases including problem analysis, idea generation and concept evaluation. Depending on the specific topic of interest, the process usually spans two or three sessions (see Figure 12.12). The groups typically involve six to eight participants, but can work with more or less people if required.

Design Decision Groups have been used for many purposes including the design of retail checkouts, telephone exchanges and library issues desks (Wilson, 1991). Other examples are given in Chapter 11.

Main advantages:
- provides a ‘complete’ approach for participatory design, incorporating problem analysis, idea generation and concept evaluation;
- adaptable and flexible — can be used for many different purposes;
- provides stimulus for probing to enable detailed understanding of key issues;
- outputs can be used to help present findings and to provide inspiration for designers.

Main disadvantages:
- requires considerable amount of time — each session lasts from two to four hours;
- for participatory design applications, it is sometimes difficult to get participants released from work for sufficient time periods;
- modelling exercises require space and materials.
12.4 CONCEPT EVALUATION

The techniques described in this section are designed primarily for the evaluation of concepts, products or ideas. In some cases, a focus group session will be set up purely with this aim in mind, for example, to gain consumer feedback on new designs for products or systems. In other cases, however, the techniques may be required for the assessment of ideas resulting from the session, following on from one of the idea generation techniques described in the previous section.

Some of the methods described here are designed to present ideas and concepts to the participants, for example, visual evaluation (see Section 12.4.2) and scenario-based discussion (see Section 12.4.1). These promote meaningful discussions, with feedback emerging in an informal way. Other methods tend to be more formal, for example, questionnaires (see Section 12.4.10). These allow data to be collected in a systematic way, permitting further statistical analysis if required. Other methods are more analytical,
for example, decision-making analysis (see Section 12.4.11). These provide systematic approaches, taking the participants through logical steps to support decision-making.

Some of the methods described in earlier sections also incorporate evaluation methods. These include nominal group technique (see Section 12.3.2) and force field analysis (see Section 12.2.3).

12.4.1 Scenario-based Discussion

The principle behind scenario-based discussions is that by describing usage scenarios, people are forced to think about what they do, when they do it and how. This helps raise their awareness, including any problems or good features of existing products and systems. In some ways, this is similar to the immersion and warm-up exercises described earlier, for example, diaries/journals or ‘day-in-the-life’ exercises (see Section 12.1).

Scenario-based discussions are particularly helpful when the topic area is concerned with the future, rather than just the ‘here and now’. People can relatively easily explain and discuss their feelings and opinions about the present. It is more difficult, however, for them to imagine how they might feel about future products or systems, or to define what they might require from them in the future. The use of scenario-based discussions provides a structure that helps address these problems.

Lee Cooper and Chris Baber describe scenario-based discussions in detail in Chapter 9. A basic procedure for sessions to explore future products and services is as follows.

**Develop usage scenarios.** Ask each participant to develop a set of usage scenarios for the current day equivalent of the future product or system. For example, Lee Cooper and Chris Baber used ATMs (automated teller machines, or cash-points), Internet banking and wallets or purses as current day equivalents of the electronic wallets of the future. Give the participants pens and paper to record their scenarios, using pictures and words.

**Identify significant features.** Ask each participant to identify features of the scenarios that they consider significant. For example, with the wallet project described above, storage and access were seen as significant features.

**Discuss features.** Ask the group to discuss the pros and cons of the significant features. Use the discussion session to elaborate these, allowing participants to use their own stories and analogies to bring them to life.

**Demonstrate new product concept.** Introduce the new product or service to the group, explaining its main features.

**Assess concept.** Ask the group to assess how the features of the new product or system would emphasise or de-emphasise the pros and cons identified earlier.

Although the procedure described above is for assessing a previously identified product or system (for example, an electronic wallet prototype), it can also be used to identify requirements for new products and systems. In this case, the fourth step (demonstrating the new product) is replaced with an *idea generation* step where participants are asked to identify new features that will emphasise the pros and de-emphasise the cons identified earlier.

Main advantages:

- helps when evaluating future products or systems;
- can also be used as a basis for generating and evaluating new ideas;
Focus Group Tools

- provides a stimulus for discussion and probing;
- outputs can be used to help present findings and to provide inspiration and stimuli for designers.

Main disadvantages:
- fairly complex procedure;
- may be unfamiliar for some participants. May require clear briefing and some assistance from the moderator;
- may be time-consuming.

12.4.2 Visual Evaluation of Products or Systems

The simplest form of product or system user testing is to provide a visual stimulus, which subsequently allows the participants to provide feedback in the discussion and also, if required, via a more formal mechanism such as a questionnaire.

The method is versatile and can be employed to assess existing or future products and systems. It is particularly helpful for future products and systems because key details on a wide range of options can be presented or demonstrated to the participants without the need to produce expensive prototypes or models.

Product or system demonstration for this form of evaluation can take many forms, including:

- visuals or images showing how a product looks, what its key features are and how it is intended to be used (Figure 12.13);
- schematics or storyboards showing a proposed system, incorporating its key features and how it operates;
- computer-generated animations to show a product from a range of different angles, or with different surface colours or features;
- virtual reality models to show the layout of rooms and workstations in a building and allow a virtual tour;
- screen shots of a proposed human computer interface to show appearance, general operating principles and system features. Examples of typical interactions can also be shown.

Whilst these are relatively inexpensive and simple ways of presenting concepts to participants, the feedback will be of limited quality. Without 'hands-on' experience it is hard for individuals to gain a realistic impression of how something really looks and feels, or whether it will in reality provide the benefits they are looking for.

Visual presentation of ideas does, however, provide a valuable stimulus for discussion and enables a wide range of different concepts to be evaluated early in development. It is also provides a reasonably realistic simulation of Internet or catalogue shopping, where products cannot be handled or 'tried out' and have to be assessed largely from their looks alone.

In Chapter 3, Wendy Ives describes how concept boards can be used to introduce new concepts and ideas to the participants for feedback. She recommends that these are designed to be easy to read and understand, with illustrations that are straightforward to interpret. This is vital for sessions with older participants and those who may be visually impaired – see Chapter 7 and Appendix 1 in Chapter 5. Interestingly though, Wendy Ives also notes that it can be helpful if concept boards have a home-made or unfinished look so that people are encouraged to suggest alterations.
Main advantages:

- adaptable and flexible. Can be used for a wide range of products and systems, and for evaluating future products or systems at an early stage in the development process;
- simulates Internet or catalogue purchasing experience;
- relatively low cost;
- provides a stimulus for discussion and probing.

Main disadvantages:

- quality of feedback is limited due to lack of hands-on experience;
- presentation/concept boards are time consuming to prepare.

12.4.3 Product Handling

Product handling enables participants to handle objects in much the same way that they do in a retail showroom. Whilst this does not permit any realistic testing (for example, filling a kettle with water), it does allow people to form gut reactions, taking into account weight, comfort and texture as well as physical appearance. Participants can also assess ease of use to some degree, and gain an impression of features they like or dislike, for example, the feel of the way the switch operates. The method can be used with real products (Figure 12.14), or models and prototypes of future products. As with visual evaluation (see Section 2.4.2), feedback can be via the discussion or more formally, using questionnaires for example. Observation (perhaps with video recording) of participants whilst handling the products can also provide additional information to the researchers about participants’ reactions and some of the more obvious usability problems.

Figure 12.13 Visual stimulus to gain feedback on ideas for mail delivery cycles (courtesy of Royal Mail)
Product handling provides a much better basis for participants to provide feedback on products, and can be more effective than relying on evaluation based on visual images alone. It simulates the situation people usually face when purchasing in a retail environment. It has limited use for systems or for complex products, which are likely to require more in-depth assessment, perhaps using some form of user testing (see Section 12.4.4). Some simple guidelines for setting up a product handling exercise are given below.

**Labelling.** Ensure that all the products are adequately labelled, using numbers or letters.

**Presentation.** Make sure they are presented in a convenient way, for example, on a table at an appropriate height.

**Briefing.** Provide a clear briefing to participants so that they know what to do and in what order, including completion of questionnaires or forms if appropriate.

**Minimise bias.** Ask participants not to discuss their thoughts before they have completed the exercise. If appropriate, remove or disguise branding and/or manufacturer information – this may influence some participants' views.

Main advantages:
- useful for evaluating existing products or models/prototypes of products under development;
- feedback is based on hands-on experience, so is more realistic than purely visual stimulus;
- simulates a typical consumer purchase in a retail environment;
- provides a helpful stimulus for discussion and probing;
- observation and questionnaire feedback can provide additional information.

Main disadvantages:
- quality of feedback is limited – handling of products is not truly representative of day-to-day use and experience;
- more suited to the evaluation of products than systems;
- requires substantial planning.
12.4.4 Product and System User Testing

There is a fine dividing line between product handling (see Section 12.4.3) and user testing. It could be argued that product handling is a form of user testing in that people get the chance to handle the product and imagine what using it might be like. The distinction drawn here is that with user testing, participants engage in a meaningful interaction with the product or system that attempts to mimic real-life usage. For example, rather than just handling an iron, participants might be given the chance to fill it with water, iron some clothes and then pack away afterwards.

In some cases, users cannot give meaningful feedback without having taken part in some form of user testing. For example, people could not discuss the ease of use of a new photocopier if they had not had the chance to carry out a range of copying jobs, filling it with paper or clearing a jam. Likewise, a focus group discussing the design of a new website will be limited in value if the participants are only given a demonstration. The feedback will be much more useful if they are given a chance to try the system out, for example, by performing a range of tasks on a working prototype.

Apart from providing the participants with the necessary experiences for the discussion session, user trials can also provide objective data. This includes information such as the time to complete certain tasks and the number of errors made. Observation of individuals carrying out the tasks can also provide helpful supplementary information. Questionnaires or interviews may be used to capture subjective feedback. The validity of this data is, of course, dependent on a number of factors such as the number of participants and the realism of the trial, but is nevertheless often useful to support the focus group findings or vice versa. Caplan (1990) describes how he twins focus groups with user trials for this reason.

User testing can be associated with focus groups in two main ways, either by incorporating it as an exercise within the session, or by carrying it out in advance. The choice will largely be dependent upon practicality and appropriateness. With lengthy or complex trials it is best to carry them out in advance, and use the focus group to discuss the participants' experiences and the results. Quick and simple trials requiring limited facilities can, however, be incorporated within the session, particularly if all the participants can carry out the trial at the same time.

This chapter is not intended to describe in detail the different methodologies and techniques for user testing. Some general principles for the design of user trials when used alongside focus groups are however described below. For further guidance in this area, refer to McClelland (1995) and Nielsen (1997).

Define the purpose of the trial. This is likely to be similar to the overall aims of the focus group study. This will determine issues such as which features or attributes of the product or system need to be assessed and whether it is necessary to compare two or more similar products or systems.

Acquire product(s) for the trial. This will be easy if off-the-shelf items can be used, but in many cases, production of a mock-up or prototype with the necessary attributes and/or functionality will be required. Often such mock-ups can be fairly crude so long as they simulate the desired features or attributes effectively enough. For example, with a human computer interface, screens can sometimes be presented on paper, or as simple slide shows.

Define appropriate trial tasks. Tasks determine the interactions that the participants have with the product or system. If the aim of the study is to uncover and increase the understanding of participants' general reactions, then the tasks need to expose people to a wide range of interactions. If the study is concerned with more specific details, then the
tasks should be focused more on those areas. The tasks should simulate real-life experiences as far as is practicable. In cases where off-the-shelf products are being explored, it is sometimes possible to give them to individuals to use as part of their normal daily routines prior to the group session.

**Define appropriate measures and data collection methods.** These include observation (possibly with video recordings), time taken to perform tasks and errors made. Subjective data such as comfort, satisfaction and ease of use can also be collected using questionnaires or interviews as appropriate. Bear in mind that the subjective issues raised may provide a key focus for the subsequent discussion session.

**Define a procedure for the trial.** This should include an introduction, familiarisation, trial tasks and data collection. Test the procedure in advance to establish the time required and to ensure smooth running.

**Minimise potential for bias as far as possible.** Ensure that participants do not share their views and experiences before the trial has been completed. If several different products or systems are being tested one after another, ensure that the sequence of testing for each person is different. This helps minimise the effects of learning (it tends to get easier as they go on) and tiredness (it becomes more difficult). Be consistent with the treatment of each participant. Employ the same script and procedure for each participant to reduce the possibility of people picking up unintentional cues that might affect their performance or responses.

**Main advantages:**
- helpful for evaluating existing products or models/prototypes of products under development. Can also be used for systems as well as products;
- feedback is based on experience performing real tasks, which is more realistic than purely visual evaluation or product handling;
- provides a stimulus for discussion and probing;
- observation and questionnaire feedback can provide additional information.

**Main disadvantages:**
- quality of feedback is limited to some extent — even well-designed trials are not truly representative of day-to-day use and experience;
- trials can be time-consuming to prepare and conduct.

### 12.4.5 Simulation and Role Playing

Within a focus group or participatory design context, simulation and role playing is a way of bringing concepts to life so that they can more easily be assessed. In broad terms, with simulation and role playing, the concept under scrutiny is mimicked in some way, with participants playing roles to enact typical scenarios of use. The method is extremely flexible and can be adapted to suit many different applications from exploring novel ways of interacting with a product or system, through to the layout of a manufacturing workstation or the design of new work processes.

The complexity of the simulation can be quite basic, for example, walking through a series of tasks on a mock-up workstation built by the participants as part of a modelling exercise (see Section 12.3.8). In some cases, however, a more sophisticated approach might be needed, using technical support, or well co-ordinated back up teams.
Sato and Salvador (1999), for example, use focus troupes in which short skits featuring new product concepts are acted out for the participants, demonstrating how the new products might be used. This provides a full understanding of the operations and implications of the product. The participants are then able to take part in structured conversations about the concept to test understanding, explore possibilities and provide criticism. Sato and Salvador also describe a range of other theatre techniques to enable the participants to become more involved. These include the following.

**Act out roles or skits.** These can be scripted or unscripted, and can be acted out individually or in groups. This can support researchers’ understanding into how individuals structure their ideas and experiences.

**Act out what goes on inside a product.** This helps reveal participants’ beliefs about a product. It can help generate ideas for icons and make processes more visible.

**Transform a product.** One person acts out using the product, then hands it on to the next person who builds on this, or finds a new use. This reveals stereotypical actions and can sometimes lead to novel uses.

With *behaviour anticipation* (McCallion, 1999), scenario planning and rapid prototyping are used to define a range of possible usage scenarios for a new product or system, and then immerse potential users in those scenarios. The process starts by analysing current processes, practices and environments, including interviewing potential users or users of existing equivalent products. This information is then used to develop a range of discrete scenarios to explore key features of the new product or system. The scenarios are described in detail through written stories, incorporating models of different options for the product or system. Potential users then act out the scenarios, interacting with the prototypes as required. This exposes them to a wide range of possibilities, and helps them provide more useful feedback, including identification of their own preferred scenarios.

**Main advantages:**

- useful for evaluating new concepts for products or systems, including future concepts where there is no experience of use;
- involving participants in the exercise, provides a form of hands-on experience;
- provides a stimulus for discussion and probing;
- video recordings of exercises can provide valuable feedback for clients or designers.

**Main disadvantages:**

- quality of feedback is limited to some extent – even detailed simulations are not truly representative of day-to-day use and experience;
- exercises take time to set up and run;
- sophisticated simulations require extensive detailed planning and support.

### 12.4.6 Product Personality Profiling

Product Personality Profiling is a projective technique that provides an insight into participants’ emotional responses to a product, including who they perceive to be the target user. It is particularly geared towards products, but could potentially be adapted for use with other applications; website designs for example. Feedback from such exercises helps to reveal how various features of a product might determine consumers’ emotional responses to it. This can help determine design directions for new products.
With this technique, participants are asked to imagine a product as a person with a particular personality, and provide information regarding its character and lifestyle, for example, gender, age and occupation. The exercise is carried out within a short space of time (typically 2-3 minutes per product) in order to encourage rapid ‘gut’ responses. The results provide a stimulus for discussion to further understand the motivations behind people’s choices, and can also be analysed later in more depth if required.

A practical method for carrying out a product personality profiling exercise is described by McDonagh et al. (2002). Participants use a questionnaire to record their responses to different products (Figure 12.15). This can be an unfamiliar activity, which some people may experience difficulty completing. As shown in the example, providing a list of cues helps participants fill in the forms.

Figure 12.15 Product Personality Profiling (from McDonagh et al., 2002)

Main advantages:
- provides insight into people’s emotional responses to a product and the reasons why;
- can help determine design direction for products in development;
- provides a valuable stimulus for discussion and probing.

Main disadvantages:
- participants may be unfamiliar with the exercise, experiencing difficulty in responding and completing the task;
- very subjective and responses can vary greatly between individuals;
- interpretation of the results can be complex;
- requires considerable pre-preparation, for example, product feedback forms.
12.4.7 Association

Association is another type of projective technique. It generates information from participants by encouraging them to make associations with other stimuli as a way of expressing their feelings towards a concept, product or service or other entity. These reactions can then be used to probe further and stimulate discussion. Greenbaum (1998) describes several types of association techniques. These include personality associations, situational associations and forced relationships.

Personality associations use photographs of people to stimulate the participants' thinking and help them articulate their feelings about the topic. Personality associations can be fixed or variable.

With variable association, the set of pictures is tailored to suit the specific focus group topic. For example, if researching cleaning appliances, the set would be made up of pictures from within a domestic environment, and might include people exhibiting different moods – proud, tired, dissatisfied and so on. A typical use for this technique would be to ask the participants which of the people shown is the user of the cleaning appliance under discussion, and then to probe the reasoning behind the responses.

With fixed personality association, the moderator uses a standard set of pictures, irrespective of the topic. Typically these would include a range of different types of people including, for example, young, old, sophisticated, educated and so on. Because the researcher becomes familiar with the personality profile of each image in the set, they can use this as a method for probing the reasons behind the associations people make between a specific photograph and the product or concept being researched. In some respects, this is similar to Product Personality Profiling (see Section 12.4.6). A typical use for fixed association would be to ask participants which of the people shown to them would be likely (or unlikely) to purchase a certain product, or use a certain service and then record the responses on a tally sheet. This gives an overall indication of the perceptions of the group, and also provides a stimulus for further probing.

Situational associations work in a similar way, except that instead of focusing on people, the pictures emphasise specific situations or places. Within the context of human factors/ergonomics and design, this method can be used to explore participants' desires in relation to physical or social environments. For example, pictures of various situations regarding travelling can help people articulate their thoughts about which aspects of the travelling experience they like, dislike or would ideally like to see.

In forced relationship projections, people are asked to make more abstract associations with images from categories such as animals, colours, cars/automobiles or food. Participants are asked to indicate which images most closely relate to the topic being discussed. The choices made provide an indication of the participants' feelings towards the topic and provide interesting perspectives about it. Greenbaum (1998) describes some typical associations:

**Animals.** Bear (caring, large, friendly). Lion (strong, powerful, not as friendly as bear). Racehorse or greyhound (sleek, streamlined, efficient, sometimes prestigious). Snake, reptile or rodent (normally negative associations, not friendly, unpredictable). Turtle (slow-moving, backwards).


**Food.** Burger, steak or potatoes (stable, reliable, consistent). Soups or breads (wholesome, excellent appeal). Vegetables (desirable, good for you). Foreign or exotic food (unusual, not always viewed favourably).
Collages and mood boards (see Section 12.1.7) are similar to these techniques in some respects in that people express their feelings and experiences using images. As with collages, association transcends linguistic limitation. It is an effective technique with adults and children alike. Figure 12.16 shows how association can be used to gain non-verbal feedback from users to inform the design of products, in this case, related to ironing.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Mood board used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which image resembles your mood whilst ironing?</td>
<td><img src="image1" alt="Mood Board" /></td>
</tr>
<tr>
<td>Which image would you like to resemble your mood whilst ironing?</td>
<td><img src="image2" alt="Mood Board" /></td>
</tr>
<tr>
<td>Which image best resembles the environment that you iron in?</td>
<td><img src="image3" alt="Mood Board" /></td>
</tr>
<tr>
<td>Which image best represents the environment that you want to iron in?</td>
<td><img src="image4" alt="Mood Board" /></td>
</tr>
</tbody>
</table>

*Figure 12.16 Mood boards used to explore associations for ironing, ironing products and environments (adapted from McDonagh et al., 2002)*

Main advantages:
- provides an insight into peoples' emotional responses to a product or service and helps to reveal the reasons why;
- useful technique for working with children;
- provides a stimulus for discussion and probing.

Main disadvantages:
- requires preparation/availability of suitable images – this can be time-consuming;
- extremely subjective and responses can vary greatly between individuals;
- relies heavily on a skilled interpreter (moderator/researcher).

### 12.4.8 Conceptual Mapping

Conceptual mapping can be used to explore participants' feelings and perceptions about products by asking them to categorise them, or group them, according to similarity. The ways that people group the products can then be explored in discussion to identify issues that can guide future development.

Greenbaum (1998) describes a simple method. Each participant is given a sheet with a grid on it and allowed five minutes to mark in all the products or items being...
assessed, grouping them as they think most appropriate (see Figure 12.17). The participants do not have to use the whole grid, and if the grid is too small, they can add more squares. The session can then proceed as follows.

**Identify categories and rules used.** Discuss the outcomes to find out what categories and rules individuals have used when grouping the items. This can lead to a greater understanding about the rationale participants have used to create the categories, and the types of features they consider when analysing products. At this stage, the actual placement of the specific items is not important, just the categorisation methods used.

**Identify predominant approach.** Through discussion, establish which categories and rules are predominant. Mark up a labelled grid on a flip-chart to reflect this (moderator).

**Achieve consensus.** Through discussion, try to achieve consensus as to where each item should be placed. The discussion resulting from this allows greater understanding about the participants' perceptions of each item, why certain items have been placed in certain boxes and the perceived similarities and differences between items.

This technique is relatively simple and provides a framework for further probing. Aiming to achieve consensus (both in terms of categories and item placement) provides a useful focus for the discussion, but the final result is relatively unimportant since it is the information revealed in discussion that is of main interest.

<table>
<thead>
<tr>
<th>Phone M</th>
<th>Phone A</th>
<th>Phone D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone C</td>
<td>Phone E</td>
<td>Phone F</td>
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<tr>
<td>Phone R</td>
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<td>Phone N</td>
<td></td>
<td></td>
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<tr>
<td>Phone J</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 12.17 Example conceptual map showing how a range of telephones might be grouped

**Main advantages:**
- provides an insight into the ways people analyse products;
- provides feedback on participants' perceptions of specific products or product types;
- easy to set up, minimal pre-preparation;
- provides a stimulus for discussion and probing.

**Main disadvantages:**
- initial categorisation exercise can be difficult for some participants;
- does not provide definitive 'result'. Not suited to participatory design problems.
12.4.9 Attitudinal Scaling

Attitudinal scaling is a probing technique that is based on identifying the key attributes of a group of products, and exploring how individual products are perceived in relation to these. It provides insights into the features that are considered most important and promotes better understanding of how people assess a product's ability to meet the requirements. It also provides insights into the trade-offs that people make. In the context of human factors/ergonomics and design, an example might be the trade-off between numbers of features (complexity) and ease of use.

The basic procedure (based on Greenbaum, 1998) is as follows.

**Determine key attributes.** Discuss the product or topic of interest to identify the most important characteristics, both in terms of positive features/impacts and negative features/impacts. Determine common attributes from these where possible. For example, with camcorders, complexity and ease of use would probably be common themes, but price and reliability might also be important. Decide which attribute to explore further.

**Conduct scaling exercise.** Give each participant a graph (see Figure 12.18) and ask them to mark on the axes the attributes for exploration, in this case, complexity and ease of use. Ask each participant to mark on the graph where they think each product lies.

**Share outcomes.** Draw the graph on a flip-chart so that everyone can see it, and mark up the responses from participants – from just one or two initially.

**Probe perceptions.** Use the outcomes as a stimulus for probing why people have given their answers and the extent to which others agree or disagree. The responses from other participants can be added to the graph as required. The focus is on trying to understand the participants' perceptions of the products and how and why they make the trade-offs. This can be helpful in revealing and support the understanding of consumer decision-making in purchasing situations.
Main advantages:

- provides an insight into which product characteristics people think are important;
- provides feedback on participants' perceptions of specific products and why they have those perceptions;
- relatively easy to set up – minimal pre-preparation;
- provides a stimulus for discussion and probing.

Main disadvantages:

- only appropriate when trade-offs exist or are relevant to the research;
- scaling exercise can be difficult for some participants;
- some characteristics are hard to assess without hands-on experience;
- does not provide definitive result.

12.4.10 Questionnaire

Questionnaires provide an additional method for capturing feedback from participants during a focus group. They can be used in conjunction with other techniques, for example, visual evaluation, product handling and user testing (Figure 12.19). Questionnaires can be completed early in the session and used as a stimulus. Alternatively, they can be used to summarise participants' views at the end of a session. Another common use in the focus group context is to gather factual information about the participants themselves, although this information is not used in the context of the discussion itself.

There are many different types of questions, including ranking, rating, closed (pre-prepared answers) or open (free response answers). Because the questions are predetermined, questionnaire results can be more easily analysed than the outputs of a discussion. If there are only a small number of people involved though, the data are unlikely to be statistically secure, yet still valuable nonetheless. Detailed guidance on the design of questionnaires is beyond the scope of this book. For more information, see Sinclair (1995). However, some general principles for their use in the focus group context are given below.

Avoid long or cumbersome questionnaires. The purpose of the focus group is the discussion session, so time spent filling in questionnaires is lost discussion time. Keep the number of questions to a minimum.

Take care with the wording of the questions. They should be easy to understand and unambiguous. Use familiar language and avoid technical terms and acronyms. Keep questions short and to the point.

Avoid leading questions. Do not use questions that might lead the respondent into giving certain answers, for example, 'do you agree that Product A is easier to use than Product B?'.

Design for ease of completion. Limit the number of questions requiring free response answers because these take longer to answer. Closed (tick box) questions, rating scales or ranking are relatively quick to complete.

Use a clear layout. Ensure that the questionnaire is laid out clearly to make it easier to complete and minimise mistakes. If participants are likely to be visually impaired, layout clarity is even more important (see Chapter 7).
Regarding the visual appeal of this product, what do you think?

1. a) of its shape and styling? (e.g. form, proportion, character)
   - very poor
   - poor
   - OK
   - good
   - very good

2. b) of its colour? (e.g. sympathy, subtlety)

3. c) of the materials used? (e.g. texture, strength, surface)

4. d) of its size and weight? (e.g. mass, dimensions, weightiness)

We need to find out whether you have got any previous knowledge of this model.
Please tick in case you:
- currently own it
- use it
- used it in the past
- have seen it before
- have not seen it before

5. Would this product suit your kitchen?  yes no

6. Would you want to buy this product? yes no

7. Please estimate the retail cost of this product: £

Figure 12.19 Questionnaire used to retrieve aesthetic preferences (from McDonagh et al., 2002)

Main advantages:
- structured format provides a quick way of summarising participants’ views;
- standard format means that data can be easily analysed if required;
- provides a good stimulus for discussion and probing if carried out early in session.

Main disadvantages:
- questions are pre-determined, thus limiting the range of responses to some degree;
- pre-preparation required;
- consumes time within the session.

12.4.11 Decision-making Analysis

Used by Caplan (1990) in his focus group studies on photocopiers, decision-making analysis provides numerical results to help understand the participants’ views on the relative importance of certain features or functions and the extent to which different designs satisfy these. The outcomes can be helpful, for example, when needing to choose between a number of different design directions.

The analysis is best carried out towards the end of a focus group. This enables the group members to fully understand the designs and allows discussion of key features in the normal way. Sometimes the participants can complete the entire analysis within the session. In some cases, however, the scoring of features may require input from specialists, for example, an engineer’s report on technical performance. These will therefore need to be completed at a later date.
Table 12.3 Example decision-making analysis results table (from Caplan, 1990)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Importance weighting</th>
<th>Goodness rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DC</td>
<td>DS</td>
</tr>
<tr>
<td>Ease of loading scroll</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Ease of installation/removal</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Ease of CFF jam recovery</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Ease of mainframe jam recovery</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Ease of platen cover handling</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Manual copying</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Visibility of originals</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Removal of job in mid-scroll</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Appearance</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Availability of correctly stapled copies</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Caplan’s technique for decision-making analysis is described below, and an example is shown in Table 12.3.

Establish acceptability criteria. Use the focus group discussion to identify the key criteria for the evaluation. For example, with a photocopier this might be 'ease of jam recovery' or 'appearance'. Identification of these criteria might include some form of brainstorming and list reduction activity.

Rate importance of criteria. Each subject rates the importance of each criterion on a scale of 1 to 10, where 10 is the most important. The importance scores or weightings for each subject (identified by their initials) are recorded on the table. In this example, subject DC considers 'ease of loading scroll' to be very important, and 'availability of correctly stapled copies' as unimportant.

Rate the goodness of each concept. For each of the acceptability criteria, the group assigns a score reflecting the extent to which each design concept (A, B or C in this case) fulfils the criterion. Again a 1 to 10 scale is used, where 10 is best. In this example, 'ease of scroll loading' is easiest with Concept A, a little less easy with B and much harder with C. For some criteria it may not be possible for the participants to assign a score. For example, if they have no experience of 'jam recovery', then they cannot rate it. In these cases, the scoring will have to be done afterwards by an appropriate expert.

Calculate the acceptability values. In this example, acceptability values are operability values. The acceptability value is the sum of importance multiplied by goodness for all the acceptance criteria. Calculate this for each subject for each concept. In this example, subject DC’s acceptability value for Concept A (447) is \((10\times10)+(10\times7)+(9\times10)+\ldots\)
If there are clear differences between the concepts, then the preferred option is clear. If the differences are small, closer inspection may be required.

Main advantages:
- requires minimal pre-preparation work;
- provides information about which aspects of the product or system are considered most important by participants;
- produces a tangible output, i.e. an overall view of areas where different concepts perform well or badly and, in some cases, a clear idea of which concept is preferred overall.

Main disadvantages:
- analysis process consumes time during the session;
- it may not be possible to complete the analysis during the session if some aspects require rating by an expert.

12.4.12 Balance Sheets or +/- Charts

Balance sheets are a simple method for analysing ideas or options by considering the advantages (pros) and disadvantages (cons). They help people to evaluate ideas in an organised way and can help groups achieve consensus.

To create a balance sheet, draw a line down a flip-chart to form two columns. Label one with a '+' and the other with a '-' . Ask the group to brainstorm the pros and cons and write these in the appropriate headings (see Figure 12.20). Make sure the sheet is labelled with the idea or product it refers to.

The exercise should be repeated for all the concepts under scrutiny. The completed sheets can then be used to discuss the options and to probe further so that a deeper understanding of key issues can be gained.
Main advantages:
- requires little pre-preparation work;
- focuses people on analysis and helps to clarify thoughts;
- provides stimulus for discussion and probing.

Main disadvantages:
- may be unfamiliar to some participants;
- does not permit numerical analysis.

12.4.13 SWOT Analysis

This is a widely known technique that has many applications in the business world, but is included here because it can help with the evaluation of ideas or concepts. It is fairly detailed and can be time-consuming, so it is best used when there is only a small number of concepts or ideas.

<table>
<thead>
<tr>
<th>System Design Concept A</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td></td>
</tr>
<tr>
<td>Very reliable (99.9%)</td>
<td>Not very easy to use</td>
</tr>
<tr>
<td>Cheap to maintain</td>
<td>High training costs</td>
</tr>
<tr>
<td>Reduced running costs</td>
<td>Very expensive to buy</td>
</tr>
<tr>
<td></td>
<td>Expensive to install</td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td>Threats</td>
</tr>
<tr>
<td>Can increase output</td>
<td>Operators may not want to use it</td>
</tr>
<tr>
<td>Can increase quality</td>
<td></td>
</tr>
</tbody>
</table>

Figure 12.21 SWOT analysis diagram assessing a new production system

SWOT stands for strengths, weaknesses, opportunities and threats. It works by analysing each idea or concept in terms of these headings, commonly using a quadrant diagram as shown in Figure 12.21. In some respects it is similar to the balance sheet method (see Section 12.4.12), but with more refined analysis categories.

It is unsuited to focus groups concerned with consumer products – for these the simpler balance sheet method is more appropriate. It is helpful, however, for groups concerned with the design and/or implementation of more complex systems, for example, for a participatory design group tasked with devising new work processes.
Focus Group Tools

Main advantages:
- requires minimal pre-preparation work;
- focuses on analysis and helps to clarify thoughts;
- useful for participatory design groups.

Main disadvantages:
- can be time-consuming to complete thoroughly;
- unfamiliar method for some people. Not suited to sessions with the general public.

12.4.14 List Reduction

This is a simple filtering technique that helps to reduce brainstormed lists of ideas or concepts down to a manageable size. It is most likely to be used alongside discussion sessions aimed at problem solving, perhaps as part of a participatory design initiative. The steps are as follows.

Clarify ideas. Before attempting any analysis, go through the initial list to ensure everyone understands what the idea is.

Identify filters. As a group, identify the key criteria that must be satisfied if the idea is to remain under consideration. Examples include, cost, likelihood to improve the situation and feasibility. Use of MoSCoW rules (DSDM, 2002) is another example, where requirements are prioritised using the filters Must have, Should have, Could have and Want to have.

Review list. Review each item on the list according to the filter criteria. Cross the obvious failures from the list. Mark doubtful cases in brackets.

Repeat process. Carry out the process again if required, focusing on the remaining items, and possibly defining new filter criteria.

Main advantages:
- requires minimal pre-preparation work;
- focuses on analysis and helps to clarify thoughts;
- reduces large lists to a manageable size.

Main disadvantages:
- some participants may be unfamiliar with the method;
- requires a skilled moderator to ensure consistency and objectivity.

12.4.15 Voting and Ranking

Voting and ranking are ways of gauging the relative popularity of the products, ideas or concepts being discussed, and to help make choices. The outcomes can be used to help stimulate further discussion or probing by the moderator. Participants often like to carry out voting or ranking exercises because they provide some form of tangible result or outcome for the session.

There are several ways of setting up voting and ranking schemes, but the key consideration for their use within group discussions is speed and ease of use. There is
little point in using methods that require complex statistical analysis and provide results that are relatively meaningless to the participants. Also, due to the relatively small number of people taking part, the reliability of the outputs is limited. It is important to recognise the limitations of voting and ranking in this context, and to use the outputs appropriately. A few simple voting and ranking schemes are described below. This is not intended as an exhaustive list. The reader should adapt these methods to suit their own particular needs.

**Pair comparison.** The options are compared against each other in pairs, i.e. Option 1 versus 2, then 1 versus 3 and so on. Participants carry out the exercise individually, recording their results on a simple grid. The participants are asked to identify which of each pair is better. In the example shown (Figure 12.22), Chair 1 has been judged better than Chairs 2, 4 and 5, but worse than Chairs 3, 6, 7 and 8.

![Chair Evaluation Grid](image)

**Figure 12.22** A grid used for pair comparison of eight chair designs

As an alternative, it can sometimes be helpful to allow pairs of options to be judged as equal. When completed, the results are tabulated and scores are assigned using a simple system, such as one point for each time an option is judged better than another.

**Dot voting.** The choices on offer are written on flip-charts or display boards, and participants vote by placing stick-on coloured dots against their choices as appropriate. Participants may be given one dot or more according to need.

**Ballot voting.** Participants vote for one or more of the options by use of secret ballot. Votes are recorded on cards and handed in to the moderator.

**Ranking.** Each participant ranks the options in order of preference. If there are a large number of options, the process may be simplified by limiting the ranking to the top five or three choices. Ranking scores are determined using a simple system, for example, five points each time an idea is ranked best, four points for second place, and so on. The results can be called out by each participant and tabulated by the moderator, or the
process can be carried out secretly, as in the nominal group technique (see Section 12.3.2).

Main advantages:

- basic voting and ranking methods are simple and adaptable;
- voting and ranking helps to prioritise options;
- provides a tangible output.

Main disadvantages:

- can be time-consuming to complete and to analyse;
- unlikely to have statistical validity.

12.5 CONCLUSIONS

This chapter brings together a range of tools and techniques that can be used to extend the usefulness of focus group methods. By using these tools in conjunction with the practical guidance on logistics given in Chapter 2, designers and researchers in human factors/ergonomics can exploit the full potential of focus groups.

Flexibility is a key strength of the focus group method and the same is true of the tools included in this chapter. The descriptions given here are not prescriptive — researchers are encouraged to experiment, adapting the techniques as appropriate to suit their own requirements.

12.6 REFERENCES


Implications for design education
(8) Garner S and McDonagh-Philp D (2001)
Problem Interpretation and Resolution via Visual Stimuli: The Use of 'Mood Boards' in Design Education

Steve Garner & Deana McDonagh-Philp

Abstract

This paper defines and discusses 'mood boards' — those assemblages of images and, less frequently, objects, which are used to assist analysis, creativity and idea development in design activity. There is need for discussion since little published information currently exists to guide students and tutors. The paper proposes that mood boards can assist problem finding as well as problem solving. Primarily, mood boards provide a mechanism for students and practising designers to respond to perceptions about the brief, the problem as it emerges and the ideas as they develop. The construction of mood boards potentially stimulates the perception and interpretation of more ephemeral phenomena such as colour, texture, form, image and status. They are, like Debono's lateral thinking techniques, partly responses to an inner dialogue and partly provocation to become engaged in such a dialogue. Examples are drawn from recent work in the field of industrial design at Loughborough University.
Introduction
For anyone with experience of design education, the term 'mood board' is likely to stir up mixed emotions. When mood boards are successfully designed and used, the creative insight of designers in such diverse fields as the graphics industry, television and theatre, industrial design and the crafts shines out. When poorly undertaken they are worse than a waste of time. For design students they can seem like a meaningless addition to a project's submission requirements. For design tutors there has been, as Baxter [11] notes, little or no articulation of exactly what constitutes quality in mood boards thus giving rise to great difficulties in assessment, comparison and student feedback. Mood boards need not be expensive or time consuming to construct. They usually consist of a collection of found and/or made images fixed to a board for the purpose of presentation. Sometimes found objects or constructions are integrated so that the mood board becomes three dimensional. Photographs, images from magazines or the internet, samples of fabrics or colour swatches, drawings, industrial and natural objects such as wire and leaves, and abstract graphic experiments in texture, colour or form are commonly juxtaposed on an A3, A2 or A1 sheet of card or foamboard. The collections of images and objects aim to represent emotion, feelings or 'mood' evoked by the original design brief or the brief as it develops. Abstract imagery is often more successful in this than figurative images which can have strong literal interpretations. As they tend to be purely visual, the boards transcend linguistic restrictions. They nevertheless have an important function in developing students' ability to articulate their thinking. In the same way that the icons used by major product corporations such as Nike, Adidas or BMW are intended to convey positive connotations, so mood boards are intended to explore and communicate the perceived connotations in a design brief. Exactly what the maker and the viewer are supposed to get from such a mood board is the subject of this paper.

Uses and misuses of Mood Boards
Mood boards are particularly useful for student designers whose analytical and creative skills are rapidly developing. They can be one of the most valuable tools in the whole designing process because they are potentially fast and they can provide direction and insight on which the time-consuming stages of design development are founded. Their quality lies in their flexibility in form and application and hence the guidelines for their construction need to be non-prescriptive. Their use has much in common with the strategies for lateral thinking propounded by Edward Debono three decades ago:

Lateral thinking is... concerned with breaking out of the concept prisons of old ideas. This leads to changes in attitude and approach; to looking in a different way at things which have always been looked at in the same way. Liberation from old ideas and the stimulation of new ones are twin aspects of lateral thinking. [2]

Mood boards also have this dual potential for liberation and stimulation. They can be used to respond visually and emotionally to a given design brief but their construction is part of a wider creative and analytical design dialogue. However, this design tool is not always used effectively. Poor mood boards can compound an inability to respond emotionally. In design education the context invariably makes demands on students' visual and emotional sensitivities. Students may lack confidence or be unwilling or unable to engage in such an enquiry and the use of mood boards can be an important influence on enthusiasm, creativity, insight and direction within project work. Design education could do much more to improve the exploitation of this under-valued tool.

Many students experience great difficulty in responding to and exploiting emotional qualities in their project work. They often resort to formulaic strategies which avoid risk but which invariably impoverish insight and creativity. In the experience of the authors, some students only present mood
boards because they are stipulated in the project's submission requirements. Many students fail to see the need for reflection and interpretation in this personal, loose mixing of intent and outcome. With their lack of experience, students often expect staff to see some profound value in their collection of images without any explanation. They can fail to realise that a major value lies in the realisations and other cognitive progressions which take place for the maker and not in the physical output and subsequent interpretation by others. Having said this, there is also significant value in the learning which takes place in the iterative cycles of making, interpreting, discussing and remaking. Mood boards can be a profoundly liberating tool for design students. Like all tools in a designer's toolkit the value of mood boards depends upon them being integrated and used. Mood boards are not an end in themselves.

**Mood Boards: process or product?**

Like underdeveloped design folders, weak mood boards are the outcome of a widespread belief by students in schools and universities that the final proposal or 'product' is the only part of the submission which should really count. This is in spectacular contrast to many teachers and tutors of design who demand evidence of a sound 'process', while overlooking blatantly weak proposals. Thus, as far as some students are concerned, supporting material has to be paid lip-service to (not least because marks are attached to it) but that so long as there is a predetermined quantity of output in each category then it matters not when, where, how (perhaps even by whom) it was produced. For some staff, as long as a disciplined and sequential process is adhered to then assessment is relatively straightforward and transparent. The quality of proposal - a potentially contentious issue - forms only one aspect of the assessment. In reality both are required. Like weak design folders, weak mood boards do not present any evidence of that restless searching which characterises good designing. In a weak process they are irrelevant appendages where the students' attentions seem to be entirely elsewhere. In a successful process mood boards seem to indicate the direction of travel for design and development. They also assist with justifying and substantiating the proposal by linking the end of the process with the beginning. Some of the features of the proposal will be visible in the qualities of the mood board or boards. Being able to see and articulate these links is an issue for both students and tutors. Teaching and learning also have to focus on establishing confidence that these outputs, in the form of both process and product, are valued as indicators of a maturing design ability.

**Mood Boards: problem solving and problem finding**

Mood boards have a central role to play in modern design education. Gone are the days when design ability was solely measured by a student's competence to respond to a set problem. While it may form part of an overall assessment strategy within a design programme the focus today is as much on 'problem-finding' as 'problem-solving'. Design education has, at various times, addressed the problem of problem-solving but it has inadequately attempted to unpack or make transparent, for design students, the problem of problem-finding. Rowe [3] presents a discussion of the integration of these two areas as the 'problem space'. Much of the derivative, unmarketable, or just plain unadventurous output of design in higher education is a consequence of a weak competence at defining the relevant problem space and mood boards can have a function here. The world is awash with various types of problems - social, economic, ecological, etc., but here we restrict ourselves to a rather simpler type which exist within and across the more fundamental categories previously mentioned. Design problems rarely present themselves and when they do, somebody has usually beaten us to it. Therefore being able, to a greater or lesser extent, to identify design problems that no one has previously articulated becomes an important goal for design education. How are
students to become aware of new problems – problems which by definition have not yet reached the awareness of those teaching the students?

There are numerous techniques for stretching the creative capacity of individuals and groups. Debono [4] developed techniques which encouraged or enforced the suspension of judgement and he documented the advantages of exploiting them:

- An idea will survive longer and will breed further ideas.
- Other people will offer ideas which their own judgement would have rejected. Such ideas may be extremely useful to those receiving them.
- The ideas of others can be accepted for their stimulating effect instead of being rejected.
- Ideas which are judged to be wrong within the current frame of reference may survive long enough to show that the frame of reference needs altering.

The use of mood boards is potentially very valuable to design thinking since they can be used to integrate and support problem-finding and problem-solving strategies. In doing so, they rely on the suspension of judgement valued by Debono. If the collection, construction, juxtaposition and presentation of relevant materials is undertaken and integrated with appropriate periods of reflection, evaluation and documentation – then the mood board as a design tool can be the pivot of a successful design process. A successful ‘product’ may not be guaranteed, but appropriate use of mood boards can make an immense contribution to a sound process likely to lead to a relevant, responsive and innovative proposal.

The following examples discuss the use of techniques which involve mood boards for creative problem finding as well as assisting with the development and resolution of design problems once articulated. All examples are drawn from the BA /BSc degree programmes in Industrial Design and Technology at Loughborough University. While the examples are all drawn from industrial design the observations apply, to a greater or lesser extent, to many other areas of design education (e.g. fashion, textiles, graphic design). The work is discussed under the two broad headings presented above, problem-finding and problem-solving. Each makes reference to six activities and their outputs: collection and construction, juxtaposition, presentation, reflection, evaluation and documentation. The final section reviews their integration.

Mood Boards in problem-finding

Students often approach the early stages of a design project with a cold, dispassionate resolution. The beginning of a project can be associated with a reluctance to apply effort and may be characterised by a low level of enthusiasm. There may be a lack of urgency but more often there is a lack of direction. Since their design brief is, quite correctly, unspecific or ambiguous the direction for investigation cannot easily be determined. Thus, the studio logic would have us believe, any effort put into investigative activities is more than likely to be in the wrong direction and thus a waste of time. However, time spent collecting information as a response to an imperfectly formed brief can prove stimulating. Even if it does not lead to new ideas it can provide insight to reasons why a particular direction for the project might not be valuable. That is, it can lead to the sort of articulation necessary within a future product design specification. Any collection of information is better than no collection, but the value of the technique depends upon what it is that is collected and what use is made of the material once collected. The examples shown in Figure 1 and Figure 2 highlight the exploitation of a wide range of published, found and made images. This particular brief, to second year undergraduates, asked students to produce a mood board as a response to their perceptions about themselves.

In both of these cases the students were in the very early stages of defining the perimeters of their ill-defined, product design brief. Their mood
boards were an attempt to respond to the context of their task. They have constructed blocks of colour and juxtaposed forms as a way of feeling their way forward. Progress must include this strategy since the nature of their task was inherently to do with product form and colour — phenomena which are almost impossible to explore via the spoken or written word. Figure 3 takes this problem finding one stage further.

Figure 3 shows a selection of the work of David Mlynski, a final year design student whose major project concerned a domestic hot water kettle. This was a significant element of coursework amounting to some 300 hours of student time and worth 25 percent of the total final year mark. The mood board appears in the centre of the illustration, surrounded by sketch and presentational drawings. The objects and images which appear on the mood board have, on the face of it, very little to do with kettles or even the boiling of water. The student was encouraged to respond to the subject which he had identified for this negotiated assignment. Part of this responding was to seek out a pre-verbal presentation of those motivational stimuli perceived in this field. The collection of material which, at the earliest stage, may or may not have been included in a future assembly, was simply a means of responding subconsciously to perceptions about the embryonic brief, the potential market, the product field and the process of addressing it. The various stones, sketches, insects, texture rubbings, photographs, and text are a personal response and took relatively little time. They were filtered and the selected 'valuable' items were mounted onto card such that a boundary was drawn between those objects which appeared to have, for the student, meaning, value and relationship and those which had less value. This newly created object, the 'mood board', facilitated an articulation which could not have taken place without it – the student concerned talked enthusiastically with staff and his peers regarding the intention. Once left on display, when the student was not there, debates took place between students and between staff concerning interpretations and meaning. The mood board proved to be provocative, ambiguous and stimulating. It gave rise to discussion of many issues which were both directly related and peripheral to kettles. The student was encouraged to keep a record of the outcome of his own reflection on this activity (via a project log book) and to add to it as many observations as possible which arose from discussions. All this took place within two weeks of the start of the project. The mood board work had significantly increased the student's enthusi-
asm (his own admission) and subsequent investigative activities were profoundly influenced by the activity. In subsequent reflection it was apparent that the 'problem space' had opened out. It had not become a search for the form of a domestic water heater, it had become an exploration of the relationship between people, materials and products which used the boiling of water as a context. In fact the student went on to produce a kettle product which used new technology to overcome the lime-scale build-up found in kettles in some geographic areas. Not only was the technological prototyping impressive but the integration of materials, textures, and manufacturability revealed a significant creative and practical capability in the student. The product proposal subsequently attracted the attention of a major UK manufacturer.

Mood Boards in problem-resolving

Just as finding the direction for project investigations can prove difficult for students so the direction for development of design ideas can seem very opaque when surrounded by a myriad of opportunities. There is, potentially, a heightened sense of fear of selecting a 'wrong' direction for the project with its consequences for wasted time, quality of proposal and, worst of all, lower grades! Thus the development phase of the project can seem as imposing as finding a brief can be. The use of mood boards in design development can allow students to juxtapose partly formed or emerging ideas. Sometimes this might involve various sketch activity or it might be a selected juxtaposition of original sketches and found material such as might have been used in the problem-finding mood board. It might also involve the work (original or found) of other people and is particularly helpful where teams of student designers are working together. The purpose of mood boards in problem solving (or perhaps, more correctly, problem resolving) is to present a selection of information which can be measured against the emerging requirements of the project (or the product design specification, PDS, as it might be called). Neither are 'fixed'. The imagery presented should not be considered as proposals since they are still ill-defined and ambiguous. Nor should the reflection be overly influenced by the PDS since part of the purpose of mood boards at this stage is to provoke a reinterpretation of the stated problem via rewording of any of the items in the PDS. Of course in skilled hands the engineering of opportunities to bring together the evolving but essentially incomplete perception of the requirement, and the ideas emerging to resolve it, can take place in various ways and may require only a project log book, computer terminal or the often-mentioned 'back of an envelope'. However, for students lacking in experience the mood board can place a new emphasis on the value of 'process'. In the examples below students found the use of mood boards stimulating to project development. Few of them had ever used mood boards in this way and it stimulated discussion and constructive output. The form of the mood boards differs considerably within the group, as indeed it should. Each participant identified their own functionality for the mood board but was able to articulate this functionality and was able to offer evaluation as a result of reflection on its use and value.

Conclusion: a few pointers

It has been proposed that mood boards have a function for both problem finding and problem solving and, as such, are vital tools in the teaching and learning of design. While mood boards are exploited in both education and, to a lesser extent, in professional design practice little of their value has been made explicit. For example, there are no texts on the use and value of mood boards in design education in the way that the teaching of drawing, materials science and ergonomics are supported. The value of mood boards was examined recently by Shayal Chhibber [5], as part of his final year dissertation. He documented the following descriptive quotation from one practising designer: 'A mood board collates colours, textures, images and material samples as a starting point prior to creating concept ideas'.
More revealingly, two further quotations highlight functionality and application: 'Mood boards are a marketing exercise, they allow the designer or design team to study the potential of a new consumer lifestyle' and 'they work best when kept abstract, images from outside the field in which you are designing'.

The same study asked undergraduate students to reflect on the value of mood boards in their own designing. One second year student viewed them as, 'a way of conveying the user, environment or product using visual material. Mood boards convey a feeling of style, emotion and appearance'. A finalist described them similarly as 'a series of images which encapsulate an emotion or essence'.

Primarily, mood boards provide a mechanism for students and practising designers to respond to perceptions about the brief, the problem as it emerges and the ideas as they develop. The construction of a mood board potentially stimulates the perception and interpretation of more ephemeral phenomena such as colour, texture, form, image and status. It is, like Debono’s lateral thinking, partly response to an inner dialogue and partly provocation to become engaged in such a dialogue. Crick [6] highlights the need for a new agenda in the education of design undergraduates. Her priorities are for sustainability but Crick identifies a complacency in the questioning processes which have a resonance with the message in this paper. Similarly, Oak [7] appeals for design educators to engineer opportunities for reflection and discussion. She promotes a greater emphasis on the questioning of assumptions. If a new dialogue of reflection, responsibility, creativity and assumption is to be fostered within design education we need to examine the appropriateness of our tools. Perhaps mood boards could play a part in our response.

And finally, some practical tips for students and tutors. Students should seek to draw upon a wide range of found and self-made resources when constructing a mood board. Enjoy the abstract and be cautious of the figurative because of the connotations and reinforcements it contains. The style of construction can vary enormously – ask yourself ‘what am I trying to achieve’; private exploration or communication of a perception? Consider making or finding three dimensional objects as well as graphic images to push your perceptions and your communication further. Avoid mass-market magazines from the major manufacturers and retailers – they will only reinforce ruts and hinder the recognition of innovation. Even lifestyle magazines with their ‘designer’ image will cause you to substitute your creative ideas for theirs. Use mood boards early – at the earliest briefing – and consider making new ones throughout the design and development process as a means of getting out of problems and dead ends – particularly where conceptual or visual problems are concerned. Be creative. Fear of failure is the enemy of creativity.

Above left (top): Figure 4 Mood board constructed in the early stages of a technological project concerning an athletics lap counter (Year 2).

Above left (bottom): Figure 5 Mood board constructed in the early stages of a consumer product (a portable, hand-held vacuum cleaner, Year 1).
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Using Focus Group Methods to Improve Students' Design Project Research in Schools: Drawing Parallels from Action Research at Undergraduate Level

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ABSTRACT: Focus groups are increasingly used in industry to elicit data on product users' less tangible needs and associated product symbolism. This can have a considerable impact on a product's subsequent sales and hence is commercially extremely valuable design research.

This paper provides an overview of an action research project which placed both a designer and an undergraduate designer, rather than a market researcher in direct contact with users in focus groups. The aim of the work was two-fold: firstly to develop a protocol for a designer to manage focus groups effectively, and secondly to see if this experience could improve the designer's ability to empathise with a range of users (socio-economic, culture, gender, age or abilities). In reporting the above, the paper also attempts to extrapolate the findings to a schools context: could focus group methods be used be used by students at a school level both as a vehicle for design research and as a learning tool?

This paper provides a background to focus group methods, together with their advantages and limitations. The action research project is described and three case studies within it are outlined. The protocols developed are described. The final section of the paper looks at the degree to which this work could be extrapolated to schools level design work both in the United Kingdom and internationally.

Keywords: design research, evidence-based design decision-making, focus group, research application

INTRODUCTION

Research is a vital aspect of any design work. At both school and undergraduate levels, design research also has a secondary value in developing the young designer's understanding of products and the social context of their use. Typically students on design and technology courses will employ questionnaires, interviews and product analysis as part of their research. These techniques, if taught and applied effectively are helpful, each offering advantages but also having limitations. For example it is recognised that users and purchasers of products have needs which are often subtle, subconscious and difficult to identify. Illustrating this Solomon (1983) argues that consumers use product symbolism to define both themselves and their
relationships to others. McCracken (1988) uses the term symbolic consumption to describe the quasi-language through which people use products to communicate with each other. Manufacturers are increasingly sensitive to this issue and recognise that research offering an insight into these needs can provide a product a market-winning edge. Focus group methodology offers one way of gaining such insights. A typical focus group is a gathering of individuals brought together to generate data through discussing particular topics and issues whilst guided by a moderator. The method relies upon a positive synergetic effect within the group, particularly supporting group-brainstorming activities within the discussion. The method has a long history in market research (e.g. Savage et al. 1995). Specific procedures are described by authors such as Morgan (1998), Krueger (1998) and Greenbaum (1998).

In industry, specialist usually carry out market research. They gather raw data, process it, and feed results to design teams. The authors of this paper considered the lack of designer/user contact to be a serious limitation to good design. A working hypothesis was generated that all designers have a limit to the degree with which they can empathise with potential users from other groups, for example socio-economic, gender, culture, age and ability. In addition it is hypothesised that:

- trainee designers would benefit from frameworks which could be used to develop their ability to empathise with users from different groups
- experience gained from such activity would internalised and, therefore, be of value in future work.

A distinctive action research project was established and conducted over a five-year period. This placed undergraduate designers directly in contact with users through focus group activities and involved them in the process of identifying user needs and aspirations. It was intended that this would broaden their 'empathic horizon' (McDonagh-Philp & Denton 1999). Not only would the designer be better informed on the needs and aspirations of users in a particular project, but they would also grow as designers from the experience and be better able to empathise with, and design for, other groups outside their existing experience. The research explored two particular innovations, these were:

a. The training of student designers in the management of focus groups. The aim is to bring the user-focus into the design team and design process itself.

b. The employment of focus group methodologies at several points within the design process rather than only at the beginning. This allows designers to explore the reaction to ideas at various stages within the development process.

The project produced case study materials and developed focus group methods and protocols for use by designers working directly with focus groups.

The objectives of this paper are to:
USING FOCUS GROUP METHODS

• Provide some background to focus groups as a research method and the ways in which the techniques embedded may support designers (Bruseberg & McDonagh-Philp 2001).
• To report the protocol arrived at after a five-year period of iterative development.
• To discuss how the technique may be utilised at undergraduate and extrapolated to school level design and technology courses.

The authors emphasise that focus group methodology should not be seen as a formulaic 'answer' to issues of design research. Best practice has long involved designers talking to users during the process of design. What is different is that focus group methods offer a way of addressing the difficulties of gaining the most appropriate feedback from users using techniques explained below. The authors consider that knowledge of these methods could expand the understanding of the young designer at either school or undergraduate levels. It is not intended that focus groups are used in exclusion to well established best practice in design research.

The paper presents an overview of the project, rather than specific detail on each of the case studies within it (references are given for published papers which focused on specific aspects). Focus group methodology is defined. The paper then explains why it is used, identifies the principles of the method and examines its advantages and limitations. Three case studies used as part of an action research programme are briefly described to establish a context. These case studies were used to explore the development of protocols to support designers' use of focus group methods directly with users. These protocols were, particularly, aimed a use by undergraduate designers. The paper then explores how these may be developed for use by schools level designers in the age range 11–18, particularly relating the principles of educational progression.

WHAT IS A FOCUS GROUP?

Focus group is an umbrella term. It centres on a gathering of target users brought together for a relatively informal discussion on a specific topic or issue. A chairperson (moderator), using a flexible schedule of questions (the moderator's draft), promotes discussion, while carefully ensuring not to direct, but guide the group through issues which emerge as important to them. A variety of techniques can be used to promote discussion. An obvious technique is to have examples of products available for direct handling.

The informality and synergy during this discussion can promote the emergence of more subtle and, to some degree, subconscious views and needs, life styles, values and behaviour. Focus groups should be conducted in a supportive environment, both physically and in the way they are dealt with by the mentor and any assistants. Many members may be uncomfortable in visiting universities or talking with groups of strangers and so
careful procedures for welcome, introduction and warm-up are need. Members need to be assured of confidentiality. The room used also needs to have low ambient noise levels and suitable lighting for audio and video recording.

THE ADVANTAGES OF FOCUS GROUP METHODOLOGY

Garner and Duckworth (1999, p. 94) found that recently graduated practising industrial designers considered themselves 'poor researchers and would now view researching skills as an important aspect of design education'. Whilst these authors were referring to undergraduate work the point is also relevant at a school level. Developing this point further, Bird (1999, p. 36) considered that the ever-increasing consumer culture requires designers to 'get under the skin of social, lifestyle and user needs'. This is a major issue. The majority of designers come from a fairly narrow socio-economic group in most western countries. Yet they design for people of all ages, cultures, abilities, gender and so on. Can a young, male, able, white middle class designer really understand and empathise with product users from very different groups? To some extent this is possible, but the authors see focus group research methods as a means of improving the 'empathic horizon'. There are, therefore, two levels of value for design research (and, within that, focus group methods). Firstly the obvious and immediate purpose relating to research for a given brief. However, there is also a secondary effect in broadening the designer's (and student's) understanding of the broad range of potential users and their needs including less tangible but important emotional aspects. This is a long term educational/developmental function; making the designer a better designer in terms of their ability to empathise with a broader range of product user. Indeed, at a school level it can be argued that this has a benefit in terms of the general education of any student: the ability to empathise with others. This is a powerful argument for the value of design education.

The success of a product is measured by the decision of customers to purchase it, but this decision is influenced by the satisfaction and pleasure gained through ownership. People do not simply perceive products as functional objects; they fulfil other purposes — based on cultural, social, and emotional needs and aspirations (McDonagh-Philp & Lebbon 2000; McDonagh et al. 2002). The designer needs to be aware of these emotional responses to create products that users can identify with. Pereira (1999, p. 227) stated 'The creative act must be an immersion into the situation of use, a truly felt empathy, not because we voluntarily acknowledge the user but because we need that connection in order to create'. If done well this not only leads to improved products but can promote brand loyalty and improve the profitability of a company.

Of course designers have long realised the above and have attempted to gain user feedback via direct interaction and specialist market research.
The value of feedback from direct interaction with users can be limited by the difficulty of getting 'under the skin' of users. Individuals, when faced with designers or market researchers may be able to give responses to questions such as colour preferences, comfort and so on but may find it extremely difficult to express their more emotive responses.

Focus groups employ the potential for synergetic interaction within a group (Hampden-Turner 1971) to encourage communication and provide insight into how others think and express themselves. This, of course, requires careful management and a sound understanding of the issues involved by the designer or market researcher managing the focus group. An example would be bringing the group together and helping individuals relax and feel they can express themselves freely. If this is achieved they can supply an efficient way of gaining an overview over various opinions at a reasonable level of detail. They provide large amounts of qualitative, concentrated, well-targeted, and pre-filtered data in a short period of time.

Focus groups should be used for topics that are poorly understood, because the discussion between people provides a variety of useful data relatively quickly. For example, focus groups provide reasons for individual opinions and experiences to be shared. The technique is therefore ideal for early, exploratory design stages (Morgan 1998a). For example, focus groups might uncover disregarded product functions, problems of the daily use of existing products in a range of environments, the current characteristics in cultural perceptions about style and fashion, or background stories that help to visualise the users' activities and needs. The technique also provides instant access to the data collected. They may also be used to investigate complex behaviour and motivations, and to uncover subconscious notions. Through discussion, participants become more explicit about their needs. Likewise, the technique is suitable to retrieve data that is not readily formulated or knowledge not thought out in detail (Morgan 1998). This may be useful, as users are not always aware of all the aspects regarding the use of products, or their own preferences. The content of the discussion might take unexpected directions or open up new topics.

Focus groups can provide a high degree of flexibility in the way questions are asked and generate qualitative data. As the numbers in a group are small, quantitative methods are inappropriate. The data provide detailed qualitative insights into people's beliefs and experiences, rather than statistically secured facts (Morgan 1998). The validity of the data can be increased by purposive sampling; selecting participants belonging to specific user groups (Cohen et al. 2000).

User research has been typically conducted at the beginning of product development, for example evaluating existing kettles and the users' reactions to them. Focus groups can be used during the design process to give feedback on the emerging designs. This can be extremely valuable as the cost of alterations to a design becomes exponentially more expensive as the design and production process progresses (idib). A product recall
due to a design fault is highly expensive and damaging to a company's reputation.

Focus group methodology in a design context, therefore, can operate on three levels:

• accessing potential users directly;
• harnessing the principles of group synergy to 'open up' members and help them express their less tangible needs;
• develop the designer's ability to empathise with a wider variety of users and contexts as a professional (and, at a school level, both as a young designer and a person generally).

THE LIMITATIONS OF FOCUS GROUP METHODOLOGY

Focus groups aim to use group synergy to promote discussion and idea generation. It is also claimed that group synergy will help individual members to uncover and express less tangible reactions/emotions/needs. Yet the term synergy is much misunderstood (Denton 1992). In the early phases of a group's life there is a process loss (idih) as members meet each other and learn to co-operate. Time and energy is spent getting the group processes in order before work can be effective on the task itself. Only when the group is established and well managed, will positive synergy contribute to the group's performance. The moderator, therefore, needs training to gain the skills required in handling groups and techniques which improve openness and free discussion. As an example there are indications (from the authors' experience) that in a mixed gender group females will tend to be less active in discussion due to gender dynamics. This can be remedied by using single sex focus groups. A moderator also has to be sensitive to personality effects that may not have been identified when a group is selected. An example would be a dominant personality who tends to overwhelm other members and reduce the synergy of the group. This can be handled by sensitive but effective chairing by the moderator.

Focus groups are, necessarily, small in sample size and, therefore cannot generate reliable statistically secure data. Nevertheless, samples can be focused more precisely and the nature of the qualitative data can be extremely valuable to the designer. Focus group methodology all too often carries a stigma, which the authors suspect, is carried over from the use of the methodology in politics, particularly in England. If the method is poorly planned and applied, then the data will, of course, be seriously flawed (as can, for example, a large questionnaire survey), but if planned and carried out methodically and with a good understanding of the issues involved the data can be valuable to the designer.

In an industrial context it is usual to pay each subject for attending and to provide hospitality in the form of drinks and snacks. There are also administrative costs in relation to letters, telephone calls, paperwork, video/audio
equipment and so on. In a school or college, payments would not be possible and it will be necessary to rely on volunteers' good will.

METHOD: THE ACTION RESEARCH PROGRAMME

This action research programme (Cohen et al. 2000) involved a design researcher setting up a series of small-scale case studies. Each was observed, data gathered and analysed. The findings were used to inform the design of the subsequent context in the programme. Each research context was treated as a Case Study (Stenhouse 1983) using triangulated methods (Cohen et al. 2000) to build a measure of reliability. As practitioner led research it was, of course, essential to establish a professional detachment from the enquiry.

The first case study took established focus group protocols used by market researchers. These were developed to enable a designer to work directly with users employing an appropriate protocol and tools to gather data relevant to subsequent design work. This case study is described in depth in McDonagh et al. (2002), and Bruseberg and McDonagh-Philp (2001). The second case study took this protocol and observed its application by an undergraduate design student, working directly with users. The data gathered formed the basis for the concept generation and development of a product (iron) (McDonagh-Philp 2000). The third case study developed this by replicating the previous study using a recently graduated designer to generate product concepts (coffee maker, kettle and toaster). Feedback was gained on how that designer adopted and adapted the initial protocol and tools.

Case study 1

The literature on focus group methods was surveyed and an outline protocol established for evaluation in this context. Focus group methods are eclectic, specific techniques are adopted to assist group members in expressing themselves. This case study included four phases;

- warm-up exercises (based on their responses to existing products);
- members then evaluated products, relying solely on visual data (to simulate mail order purchasing);
- group discussion followed which focused on their experiences, needs and aspirations;
- members handled existing products (to simulate retail outlet purchasing).

Templates were created to support data collection in each of these phases. This project concentrated on mainstream consumer products (e.g. kettles, coffee makers and toasters) (Figure 1). The protocol developed is reported below.
Case study 2

This second case study took the protocol and tools previously developed. An undergraduate designer worked with users, generated data from the group and used this to develop product concepts. The student organised and ran 3 focus group activities involving 8 participants in each session. These sessions incorporated focus group discussion, product handling and visual questionnaire exercises. The project involved the investigation of the ironing process (e.g. ironing garments) by females, aged between 25–55 (main purchasers of this product in the UK). Collaboration with a major manufacturer of small domestic appliances further supported the project by funding the focus group activities (e.g. research participant attendance fees and hospitality) and by supplying product samples.

The aim of the project was to develop focus group methodology to ascertain if this design method would be appropriate at undergraduate level. The findings include:

- the undergraduate design student was able to employ the protocol and tools;
- 'rich' design data was elicited which was found to be extremely valuable in a subsequent finalist project;
- this case study provided the opportunity for the student designer to work with users and broaden his experience, understanding and awareness;
this research design does not enable a direct comparison with the quality of design work in a more conventional student project.

Case study 3

This study aimed to replicate case study 2 and place it in the context of the design practitioner. The particular emphasis was on integrating the user throughout the designing process rather than simply using them as a pre-design phase resource. The case study focused on the design of a range of small domestic mainstream products for the future (e.g. kettle, coffee maker and toaster).

Two recently graduated industrial designers worked with one of the authors. The protocols and tools were adapted to suit this particular application. Initially a focus group was established to provide pre-design phase data. Subsequently, the group was used to gain feedback on initial design concepts. In parallel, a new focus group was formed (i.e. members not sensitised to the project). The intention here was to examine how this group (cold users) responded to relation to the first group (hot users). These groups met a total of four times throughout the project, to provide feedback at specific points in the design work.

The findings include:

- group members can become too familiar with the project and develop an interest in the outcomes – which can make their feedback biased;
- introducing new group members during the designing process can offer a fresh input and perspective. Of course this involves more work/cost;

Figure 2. Focus group discussion.
experienced designers can be more receptive and able to adopting and adapting the tools further.

FOCUS GROUP PROTOCOL

The case studies above enabled the development of a protocol for use by designers working directly with users in a focus group scenario. The section below, presents a summary of the outcomes of this process.

Planning

The objectives of the session/s need to be clarified. Often only one session is carried out in order to gain feedback for designers on user preferences on a particular type of product. It may be possible to run several sessions during a design development, each with different objectives to suit the stage in the design process.

For example there could be as many as four focus group sessions within any one design project:

- **Pre-design**: general discussions covering user experience and aspirations, using this type of product, user environment, use of materials and evaluation of existing products.
- **Concept Generation/Selection**: the designer presents their initial concepts to gain feedback (e.g. drawings but also three-dimensional models such as blue foam to enable physical handling).
- **Concept Development**: users respond to developed concepts and give feedback for further refinement. This would involve use of more developed models, for example a range of renderings giving different colour schemes and more developed 3D foam models.
- **Concept Refinement**: a final opportunity for user testing and evaluation of concept models. At this stage a new user group may be used to overcome any bias that can develop in the original focus group.
The moderator will develop a schedule (sometimes called a moderator's draft) for each meeting. Typically, the session may include the following:

- **Initial gathering** – time is given to participants arriving and mixing for a few minutes. This can be useful in that the moderator can gain some idea of the personality types involved. A good moderator tries to ensure all contribute in the session and dominant personalities are prevented from overwhelming others.

- **Introduction** – to clarify the purpose of the discussion and to alert participants to recording devices (e.g., video camera). The schedule is explained to the participants.

- **Warm-up** – short exercise(s) assist in participants relaxing before the discussion.

- **Discussion** – focus group discussion based on a schedule of questions prepared by the moderator. In some cases these may be 'closed', others may be intended to encourage more open-ended discussion. Experience helps the moderator to react to data as it emerges, perhaps following up new lines which emerge unexpectedly but which are relevant. Sensitivity may be needed in terms of relating language levels and styles to the group members. The group needs to be encouraged to discuss issues amongst themselves, rather than respond to the moderator. Discussion may be promoted by having 'props' such as models, sample products, slides, drawings and prototypes.

- **Debrief** – opportunity for participants to provide views that may not have been expressed earlier. Moderator brings the session to a close.

### Recruiting participants

Participants are usually chosen through purposive sampling (Cohen et al. 2000) targeted at typical users. If the social make-up of the group is too diverse some participants may find it extremely difficult to contribute and so their input is lost. They need to be comfortable in talking to each other, share a similar knowledge and background to encourage sharing of personal information as well as deeper and more detailed insights. On the other hand, there may be situations where contrasting opinions can generate discussions and new insight. Experience has shown that it is advisable not to mix different genders at the earlier stages of the project and keep the age range of participants to a minimum.

### Practical considerations

Focus groups are best held in neutral locations. Offices and university locations can be intimidating for many members of the general public. It is important to ensure there are no interruptions. If materials and physical objects are to be used as a part of the process there needs to be suitable space and surfaces. Refreshments help the group settle together and relax at the start of the activity.

Many focus groups are recorded on video in order to gain feedback.
from non-verbal cues such as nods and so on. Recording sessions also enable analysis after the event by the designer and other stakeholders. It is sensible to make a parallel audio recording as equipment can fail even with pre-session checks. Cameras should be positioned to be able to capture as many of the faces as possible. The microphone on a video camera may not pick up all voices from the group effectively. A good quality remote table mounted microphone may be necessary. Experience indicates the optimum layout for a session to be a round table. A trial run of all the equipment is important. Name badges can be helpful and reduce stress for members when referring to each other. Writing and sketching equipment can be helpful if an individual needs it to explain a point.

The moderator needs to encourage discussion and achieve a balance between leading the session and letting it run out of control. If the moderator takes notes it can stall discussion and make members extra sensitive to what they say. Experience shows that if the moderator asks a question and then leans back to symbolise physically moving away from the discussion this encourages members to focus discussion amongst themselves. Moderating also involves preventing dominant participants from having too much influence on the discussion, and ensuring everybody is involved and contributing to the discussion. It is also important to start and finish on time, as participants may have other commitments. Good time keeping also reassures members, should you wish to recruit them for future focus group sessions.

Feeding the data into the design project

There should be a constant flow of data between the research and the design process. Moreover, the results from one focus group stage can provide a sound basis for planning the next one. There is no need to carry out extensive data analysis such as precise tape transcripts or discourse analysis. An efficient method is to extract the main particulars from the tapes and associated forms immediately after the event. It is useful to store interesting sections of the tape on the computer through video capture — to be used as a quick reminder, and for presentations to others. It is important to respect the confidentiality of the participants.

APPLYING FOCUS GROUP METHODOLOGY IN SCHOOLS AND COLLEGES

As an area of study at a schools level, design and technology has developed considerably internationally. The discipline has moved from the design of one-off craft objects to students designing products for a broad range of users and industrial production methods. Design research, therefore, has become a relevant area of study and practice in schools. This section of the paper attempts to extrapolate findings from the action research project to a school's level. While this is not based on direct observation at this
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time one of the authors has 24 years of experience as a design and technology teacher and teacher trainer. The extrapolation is made on the basis of that experience. It is hoped that teachers will use the data above to explore in their own schools and report their findings. In this way a degree of validation can be grown.

It would be valuable for students to learn the potential and methods of focus groups at three levels. Firstly, an awareness of the methodology can be valuable to them in their grasp of the research methods designers can employ. Secondly, focus group methodology can be actually used in schools, making learning a live experience whilst generating useful data. Thirdly, experience of focus groups can have a general educational benefit, helping bring students into contact with people from other socio-economic, cultural, age and ability groups. Research (Cowie & Rudduck 1990) indicates that such contact assists in the development of empathy for others and may reduce incidence of racism.

In the early phases of most design work students need to be able to identify relevant sources of information. In the authors’ experience of schools in the UK this phase of design is often limited to an over-simplistic approach of looking at catalogue pictures of products and writing questionnaires. However, there can be considerable naivety as to the value of questionnaires. If poorly constructed they capture limited data and tend to give responses only to questions the student has thought of previously. The brainstorming techniques employed within focus groups can be far more valuable in gaining direct user feedback and, particularly, uncovering factors not yet thought of. Students of age 13–14 could, with staff support, plan and run a focus group as a whole class. For example, disabled access in the school could be explored by asking disabled users in the school to come to a focus group. Individual students could be delegated various tasks such as moderator (the whole class would brainstorm questions), audio and video recording, hospitality and so on. The results could then be pooled for individual or small group projects. For example, door handle design, signage, ramps etc. Similarly a class could become its own focus group, meeting from time to time to discuss their own feelings, needs and emotions in a design project which relates to their own age range. In this way whole classes can learn about the methodology in a practical way and the logistical costs would be minimal, assuming a group of volunteers.

At a more senior level in a school an individual student could employ focus groups within a major project. The group would be selected from potential users, probably small in number (3–5) and working voluntarily. In many cases these may be fellow students if the project was aimed at the same age range as the user (e.g. study-bedroom furniture). The student could work up a schedule including a warm-up session with coffee and introductions where everybody is encouraged to relax. The student could then act as moderator using the schedule but encouraging broad discussion. The session could be simply audio taped. It is not necessary to produce
verbatim transcripts, only to record the essence of factors emerging and an indication of the levels of agreement. Analysis is then direct, identifying categories. The student could use the focus group to assist in developing criteria for their design project. Focus groups can help identify criteria important to the user rather than simply those that a student designer can identify. This is because the technique can help explore the needs and values of others more flexibly and effectively than questionnaires. The same group could be re-convened later in the design project to give feedback on the most appropriate design directions after initial ideas had been explored, and/or to give feedback on the early stages of development of the chosen direction. Once a project is finished, focus groups of potential users offer a far more powerful method of evaluating the design than the individual student ever could. At a simple level, with younger students this could take the form of small groups of students forming 'quality circles' and effectively acting as an evaluative focus group for other students' project outcomes. This is particularly relevant if the project focused on a product to be used by that age range.

In general the student cohort itself offers a great design research resource. This can help validate their own experiences and lead to greater respect for the diversity of background and experience in the cohort itself. Having said this, it would be educationally beneficial to also engage with typical users beyond the students socio-economic group. In terms of progression, staff may initially use a student cohort for focus group activities, but should aim to expand this experience to working with groups such as adults and specific groups such as the elderly or disabled.

SUMMARY AND REFLECTION

Focus group methodology offers a flexible approach to gathering design related data that can support and encourage user-centred design. The approach can be valuable in gaining important information on users' values and well as wants and needs beyond the functional. More importantly, by becoming directly involved with focus groups, designers can broaden their own empathic horizons and so improve their own ability as designers to design for others. The approach allows the designer to get far closer to the range of users than more traditional design research methods, though these still have an important role in terms of gaining statistically reliable data (at a professional level) which focus groups cannot offer.

In schools and universities focus group techniques have the potential to improve design work but also student learning and the individual student's ability to empathise with other users. Student cohorts offer valuable design research resources in themselves. Focus groups can also access the broader community where appropriate. Looking beyond design education therefore, focus group experience can contribute to citizenship development.
and increased empathy with individuals from other sections of the community.

Focus groups are not, however, a universal panacea for design research. They have their limitations, notably in terms of statistical viability and the skill and experience needed to plan and run them effectively. Data generated can be superficial and the time involved substantial and largely wasted, as is the case with more conventional design research at a school level if techniques are not properly understood. Nevertheless, focus group techniques offer a potentially valuable contribution to the student’s armoury of research methods and techniques. The potential rewards in terms of design research and growth of the student as a designer and citizen, however, are extremely significant. It is suggested that staff should give the approach serious consideration and incorporate student experiences of focus group methodologies, with logical progression, within their long term planning.

REFERENCES


(10) McDonagh D and Storer 1 (2005)
Mood boards as a design catalyst and resource:
researching an under-researched area.
Mood boards are one method that can improve inspiration and communication during a design process. These mood boards are typically a collection of abstract media which the designer uses for personal inspiration and also to discuss and communicate with the client and possibly other stakeholders including users. The authors' experience as both designers and educators indicates that mood boards are a 'love it or hate it' issue. Some claim mood boards can inspire creativity and aid communication. Others dismiss them as of no value. The literature is curiously limited on the subject, possibly due to the subjective nature of the issue. This paper starts to explore the potential of mood boards as design research and support tools by looking at both practising and student industrial designers' attitudes to and use of mood boards. The authors conducted a scoping study that is discussed in this paper. The findings revealed that design practitioners valued mood boards as a tool for communication with non-designers and as an instrument to inspire lateral thinking. However, mood boards were undervalued and misunderstood by the sample group of industrial design undergraduate students.

INTRODUCTION

The authors are industrial designers who have used mood boards in professional practice but who now also teach industrial design at undergraduate and postgraduate levels. Experience with undergraduates indicated that while most had heard of mood boards, many misunderstood what they were and when/how they were generated and used. It also became clear that these were not simple concepts to teach.

From this experience further exploration of the issues of understanding, generation and use of mood boards was necessary. As these are complex and interrelated factors, it was decided to use a scoping study to achieve a better focus. Subsequent research could then take this focus further.

A logical start point was to clarify and reflect on the authors' own experience in the industrial design profession. Following this, the focus moved to the teaching and use
of mood boards by undergraduate industrial design students
The authors had two primary research questions:
• how does a sample of design professionals view and use mood boards?
• what are the issues relating to the teaching and learning of mood board generation and use at undergraduate level?
A multi-method qualitative research approach was adopted:
• an email/telephone survey of a small sample of practising industrial designers' use of mood boards
• a questionnaire which established the undergraduates prior experience of mood boards
• two case studies of teaching and learning contexts where undergraduate students generated and used mood boards.
The first case study involved a sample of 76 students generating gender-specific mood boards and using them in concept generation for a domestic kettle which was intended to reflect either an overtly masculine or feminine form. The second case study analysed the use of mood boards by six undergraduates who were developing a medical product. The use of two quite different contexts made it possible to establish a degree of data triangulation.
The questionnaire provided an insight into the students' perceptions, experience and understanding of mood boards prior to joining their degree programme (n=110). This data will inform further work on teaching and learning relating to mood boards.
In order to get the most out of the contact with practising designers, a semi-structured interview schedule was developed. This was intended to prevent 'tramlining' their thinking and promote open-ended discussion.
Further details on methodology are presented in this paper. The data from these sources is primarily qualitative and is presented in the relevant sections. Firstly, the paper explores some of the background on mood boards and associated style boards. Then the two case studies, questionnaire and the professional's survey are reported, discussed and conclusions drawn.

BACKGROUND
The authors have conducted several searches using Metalib (an online search engine for research papers) and the key words 'mood board' and close variants, and have been surprised by the lack of published literature. However, the authors' experience, both in professional design and academic work, indicates that mood boards are in general use. It may be that these exponents of mood boards find their ephemeral nature makes them a difficult topic to write about. Possibly design practitioners may be guarding their design tools to preserve their competitive edge? In addition, practitioners may have no reason to publish their methodology. One of the few published articles found is Costa et al (2003) which discusses 'collages' within the area of food technology. Costa et al compare the effectiveness of verbo-centric or non-pictorial research to image-based consumer research. They conclude that images can tap into different knowledge, structures and promote 'fruitful discussions'.

Damásio (1994) and Kosslyn (1994) have found that the visual system is the main way in which stimuli reach the brain. This highlights the importance of including images/visuals for individuals when accuracy of communication is important. However, individuals do use a variety of senses and designers should be aware and use these to maximum effect. Verbo-centric approaches for gathering data and design communication (e.g. interviews, focus groups, questionnaires) are well developed. Research indicates that individuals tend to lie on a bipolar scale between
verbalist and imagers (Riding and Rayner, 1998). This indicates that if we restrict our communications to one media (i.e. words), we are potentially reducing the effectiveness of communication with those individuals who are 'imagers'.

In contrast, mood boards can offer a visual-centric approach. For clarity the image and multimedia collages, commonly referred to as mood boards, are split up into two distinct classifications, mood boards and style boards. The authors consider mood boards to be a collection of abstract media (e.g. images, textures, forms). They are not a collection of literal images of products which more correctly are termed style boards. Mood boards have complex and multiple functions. They can be used to express and communicate emotions, feelings and/or moods. In addition, they are intended to promote lateral thinking around what may otherwise be a mundane design task. Figure 1 illustrates a mood board that offers abstract images, textures and impressions. It is the actual process of interpreting the visual data that provides the impression, mood and feeling. However, the interpretation is entirely subjective so other forms of communication such as keywords are often included.

The process of selecting visual data for mood boards offers a valuable process, which encourages lateral thinking, according to anecdotal evidence from designers. The mood board can offer diverse images and media, and provoke new combinations of form and style. Mood boards can also help the designer to communicate beyond linguistic restrictions by including tactile, visual and olfactory sensations.

There are multiple stakeholders in any design process. These may range from the board of a manufacturing company comprising business people and accountants, through to designers, production engineers, marketing, retail outlets and the consumers themselves. The forms of communication therefore need to be diverse and appropriate. Mood boards offer one further route for communication:

'How can you explain an appropriate urban trainer (shoe) to a Finance Director? You have to make the intangible tangible'. (Quote from a designer in the survey reported here.)

Through the use of images, textures, form, colour and shape, a design concept can be presented within a social context. This helps the designer to communicate what an urban trainer may be to someone outside the social context of the target user.

Mood and style boards can be generated prior to the design brief being formed. It involves exploration and interpretation by the designer to identify product opportunity, problems and potential solutions. The actual process of selecting a collection of images at the pre-design phase and the initial concept generation phase is a crucial point in the designing process where mood boards can be at their most valuable according to their proponents. Once the basic issues have been dealt with, there is a danger that the need to meet the multitude of regulations applicable to products today may dampen the designer's creativity. Here again, the designer can refer to the mood board to aid their work to liberate and stimulate creative thinking (Garner and McDonagh-Phlip, 2001).

Style boards need to be differentiated from mood boards.
MOOD BOARDS AS A DESIGN CATALYST AND RESOURCE: RESEARCHING AN UNDER-RESEARCHED AREA

Style boards attempt to represent the type of products that the perceived user would surround themselves with, or represent a style or ideal form that is desired for the final product. The collected images can offer the designer valuable insight into symbolic meaning and display syntax of the target user (Riggins, 1994). They offer a collection of inspirational images of desirable products that can help focus the designer into a form solution early on in the project. Figure 4 demonstrates the use of a style board to visually brainstorm the word ‘fluid’. It relies heavily on already designed and manufactured products.

DATA COLLECTION.
RESEARCH QUESTION ONE: DESIGN PRACTITIONERS’ PERSPECTIVE

Survey one. Eight design practitioners from Europe and North America were contacted to share their views, opinions and experience of mood boards. It is appreciated that such a small sample may be unrepresentative, but the findings are still valuable and offer insight.

The range of professional experience in the group varied from 2 years to 35. The survey was semi-structured, centring on two basic questions: their experiences and views on mood boards, and their use of mood boards. The survey...
Mood boards are a useful way of detaching yourself from the particulars of what already exists. Even if people don’t use actually use them, they still go through the process in their heads. Because in the particular professional situations in which I have worked, the other members of the team have been unfamiliar and unreceptive to them.

Core pictures that emphasize and polarize. You can’t beat your own creativity but there’s nothing like a bit of inspiration to get you going. Brainstorming trends, hunches and our own beliefs in future directions. We used pictures of various objects, products clothing etc, which related to what we were trying to portray, which in turn changed what came out. You might have a board with pictures, materials and even objects on it, too, like perfume bottles, ornaments, cool cutlery etc.

To show them the thoughts you’ve had and the people that you are targeting. You show the products they might buy etc; it’s called design by association. Lifestyle, show cool apartments, modern design houses, tactile objects. You show all the things that influence you. Atmosphere, it’s all to sell the idea to non designers so they can see into your mind and how you arrived at your destination.

We use mood boards at the start of all our big presentations. We always present them along side our visuals. We also use them to show fabrics, shapes, reflections or anything difficult to show in CAD. I think Mood boards are very useful, but only if you explain them well, otherwise they could be misleading. We also use them to explain where our ideas have come from.

A way of collectively grouping (visual) information that is relevant to what you are doing. If you are attempting to design for a particular market segment you have to immerse yourself.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Years of experience</th>
<th>Product area</th>
<th>Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>35</td>
<td>Transport</td>
<td>Mood boards are things you use to set the context of the particular product design process. They are a useful way of detaching yourself from the particulars of what already exists. Even if people don’t use actually use them, they still go through the process in their heads. Because in the particular professional situations in which I have worked, the other members of the team have been unfamiliar and unreceptive to them.</td>
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<tr>
<td>B</td>
<td>4</td>
<td>Transport/ Product</td>
<td>Core pictures that emphasize and polarize. You can’t beat your own creativity but there’s nothing like a bit of inspiration to get you going. Brainstorming trends, hunches and our own beliefs in future directions. We used pictures of various objects, products clothing etc, which related to what we were trying to portray, which in turn changed what came out. You might have a board with pictures, materials and even objects on it, too, like perfume bottles, ornaments, cool cutlery etc.</td>
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<td>C</td>
<td>4</td>
<td>Transport/ Product</td>
<td>To show them the thoughts you’ve had and the people that you are targeting. You show the products they might buy etc; it’s called design by association. Lifestyle, show cool apartments, modern design houses, tactile objects. You show all the things that influence you. Atmosphere, it’s all to sell the idea to non designers so they can see into your mind and how you arrived at your destination.</td>
</tr>
<tr>
<td>D</td>
<td>3</td>
<td>Point of Sale</td>
<td>We use mood boards at the start of all our big presentations. We always present them along side our visuals. We also use them to show fabrics, shapes, reflections or anything difficult to show in CAD. I think Mood boards are very useful, but only if you explain them well, otherwise they could be misleading. We also use them to explain where our ideas have come from.</td>
</tr>
<tr>
<td>E</td>
<td>20</td>
<td>Product</td>
<td>A way of collectively grouping (visual) information that is relevant to what you are doing. If you are attempting to design for a particular market segment you have to immerse yourself.</td>
</tr>
</tbody>
</table>

Table 1: Views of mood boards from practising designers.
Mood boards as a design catalyst and resource: Researching an under-researched area

Mood board is a superfluous term. At the end of the day it is the way of understanding ethereal ideas. Anything that influenced us: poetry, pieces of plastic material, magazine pictures etc are inspirational - get people on the same wavelength. Now more a deliverable than an inspiration piece. Useful/valuable? Depends on how and where it's used.

I have seen a variety of approaches covering form, materials, finishes, cultural, natural things and even cartoon characters. Some quantitative and some more qualitative. Most often used to express the designers' intentions to non-designers, including management, marketing or clients in the case of a consultancy.

Not needed to prepare a mood board since working freelance. Many clients interpret it as a waste of time. Anything to do with users is deemed to be the responsibility of the Marketing department. Relevance and effectiveness of using mood boards depends on the product context. Tool is less relevant when working with functionally driven industrial and medical products.

Table 1: Views of mood boards from practicing designers (con't).

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<tr>
<th>Respondent</th>
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<th>Product area</th>
<th>Quote</th>
</tr>
</thead>
</table>
| F          | 25                  | Product      | • Mood boards help share a collective understanding and establish a misunderstanding.  
• Mood board is a superfluous term. At the end of the day it is the way of understanding ethereal ideas |
| G          | 33                  | Product/Transport | • I have seen a variety of approaches covering form, materials, finishes, cultural, natural things and even cartoon characters  
• Some quantitative and some more qualitative  
• Most often used to express the designers' intentions to non-designers, including management, marketing or clients in the case of a consultancy |
| H          | 2                   | Product      | • Not needed to prepare a mood board since working freelance  
• Many clients interpret it as a waste of time  
• Anything to do with users is deemed to be the responsibility of the Marketing department  
• Relevance and effectiveness of using mood boards depends on the product context  
• Tool is less relevant when working with functionally driven industrial and medical products |

Results of survey of practising designers: a summary

This summary illustrates the range of views the designers in the sample hold towards the value of mood boards within their designing process. Three main factors emerged: (a) mood boards as a tool for communication with non-designers; (b) mood boards used to inspire the designer in terms of lateral thinking; and (c) to immerse the designer in the target user's world.

There are many stakeholders within any designing process. Those designers working within large companies found that mood boards were a valuable additional means of communicating with other specialisms within the company as well as external stakeholders. It was reported that mood boards assisted in providing a record of how and why decisions were made at any given point: a factor increasingly important in large companies where significant sums of money are involved.

It was reported that designers might need to explain and communicate ethereal ideas and that mood boards were an additional tool for this purpose.
The limitation of many modern CAD-based systems, such as representing a tactile quality, which a mood board can communicate simply and effectively.

When a design team is formulating its understanding of a new project, the joint development of a mood board can act as a catalyst for bringing the team together and exploring the envelope of the project. Mood boards can assist in getting stakeholders on the same wavelength.

The development of a mood board can be a valuable tool in helping stakeholders such as users to express the ethereal. They often have difficulty in articulating their needs (this includes the emotional needs associated with products). By laying out mood board components in various media, it can help establish priorities on a sliding scale of emphasis. Sometimes non-designer stakeholders ‘know it should not be this’ - but have difficulty explaining what it should be. By working together on this process stakeholders can develop a shared ‘language’.

However, the designers also pointed out that some stakeholders might not be receptive to mood boards as a means of communication. This was reported to be particularly so when dealing with all the various types of stakeholder in a ‘functionally driven’ and medical product type area. This is an interesting point as the authors would consider medical products to be more in need of techniques to identify and communicate the highly complex and sensitive nature of these products. One designer pointed out that mood boards were now becoming something of a ‘deliverable’ - i.e. a requirement by clients rather than only a tool. As such were designers now treating them as a ‘chore’? It was noted that in one company some student designers on placement were often used to generate mood boards. This illustrates that other staff were not engaging in the process of generation and so could not gain from that synergy.

**RESEARCH QUESTION TWO: PERSPECTIVES ON STUDENT PERCEPTIONS AND PRIOR EXPERIENCE OF MOOD BOARDS**

Survey two. In order to ascertain prior experience of mood boards, a questionnaire was completed by first year students on the Industrial Design and Technology degree programme at Loughborough University, UK (n=110). The questions were devised to capture the understanding, awareness and experience the students brought with them to the degree course. They had 30 minutes to complete the questionnaire whilst involved in a drawing exercise. This was done generally at their own pace in their own time. This was to encourage a more reflective response rather than a visceral response. The survey consisted of six questions:

1. Had you heard of mood boards before starting university?
2. At school, were you taught about mood boards?
3. If yes, in which school year and in which subjects did you use mood boards?
4. If no, where did you find out about them?
5. Did you use mood boards in your design and technology project work (at school)?
6. If yes, how were the mood boards used?

**Results of survey: a summary**

- 93 students had heard of mood boards prior to joining the degree course (n=110)
- of those 93, only 24 had actual experience of using them as part of a design project, which is significant because this means it is most often taught as an abstract concept and not applied by the student within a design project
- mostly taught in art and design technology
Question 6 focused on how mood boards were used. This raised a number of approaches. From the 24 students who had previous experience, they expressed a number of uses for mood boards. These include user profiling (5 responses), communicating mood (6 responses), general inspiration (16 responses), colour choice (1 response), context (6 responses) and as a style board (6 responses).

Twenty-four students identified the potential of mood boards to support their design work. The following quotes specifically relate to mood boards providing inspiration:

- as research to collate certain information/images about a particular lifestyle/style/gender to transfer into design
- to try and work out what kind of feeling the design needs to give off
- to convey the product mood as requested by the client.

Context was another interesting category that emerged. They identified that mood boards can help them to understand users, user environment and task.

- they were used to show what kind of objects/colours/activities the target market were interested in
- to show the mood or feeling for the intended product/situation
- to reflect target markets, interests and personality
- they were used in conjunction with the client to try and get an idea for the feel of the product we were to make and then evaluate, i.e. summarizing with key words, traditional, warm etc.

The questionnaire highlighted that some students had grasped the benefits of mood boards. Whilst the majority may have a limited theoretical grasp, it is clear that the process of applying this knowledge is fundamental to fully understand it.

Case study 1

In order to explore student designers' approaches to mood boards and their thinking associated with such activity, the authors conducted a pilot case study. The study involved a group of 76 industrial design second year undergraduates within the Department of Design and Technology at Loughborough University. These students had been introduced to mood boards in their first year and had also used them in a prior exercise in their second year. The questionnaire revealed a relatively wide range of understanding and prior experience of mood boards. This will have had a significant impact on learning.

The study was conducted over a period of four weeks. The first week involved the project briefing with a formal lecture on perceptions of masculinity and femininity discussed within a bipolar context. The students were encouraged to consider masculinity and femininity in the extreme, to simplify the task for the purpose of this study. A later study may focus on more complex gender-neutral factors. The students were requested to produce the following three items; (i) a mood board that conveyed their perceptions of masculinity and femininity; (ii) selection of a product that they considered represented either polarity; (iii) three words to communicate their understanding of either masculinity or femininity. By choosing three, it was intended that the students would provide a shorthand overview of their perceptions of masculinity and femininity.

The weeks that followed concentrated on each student designing two kettles (one extremely masculine and one extremely feminine). Figure 5 illustrates the designing process of one of the students who initially focused on femininity and then went on to design two gendered kettles.

This study was evaluated through collective group feedback, one-to-one discussions and assessment of each student's submission. In addition, a sample (n=6) of students
MOOD BOARDS AS A DESIGN CATALYST AND RESOURCE: RESEARCHING AN UNDER-RESEARCHED AREA

Mood board | Product example of extreme femininity
---|---
Initial sketches for the feminine kettle | Initial sketches for the masculine kettle
Final feminine kettle rendering | Final masculine kettle rendering

Figure 5: Designing process for the concept design (mood board, product example, key words, initial sketches and final renderings).

were individually interviewed following the completion of this exercise. The interviews were of a semi-structured type. They explored individual student's understanding of mood boards and the role they perceived them to play in their designing process.

Results of case study 1: a summary

The majority of the students failed to adequately demonstrate a working knowledge of (a) the process and/or (b) the application of their mood board. The (academically) stronger students presented more lateral mood boards and there was evidence that the collection of images were employed and developed by these students through their design process. Even though the students had developed and used mood boards over a 16-month period, prior to this pilot study this tool still appeared to be misunderstood by many and was not referred to during the concept generation stage. This may be through a lack of experience in critically analysing visual data. The students in this sample tended to approach the mood board as a means to an end. Mood boards are not necessarily treated as a useful tool to support and enhance their own designing solution. Students tend to produce them to satisfy the lecturer or meet an assessment requirement. Table 2 summarizes students' views on mood boards.

Case study 2

In order to develop a deeper understanding of the results from case study one, the authors took the opportunity to analyse student work with mood boards on a very different type of design exercise. Six industrial design and technology students from various years of the degree programme were involved in an intensive two-day design workshop. They were focusing on designing female portable urinary products (pads and urinals) for a target female user of 35 years and over, a challenging task for young designers. This product type was chosen specifically as it took the students beyond their own direct experience into a context that they had little knowledge and experience of or empathy with.

This workshop differed from the students' normal learning experience (concurrent projects) as it involved a single task/project over the two days. A range of conventional design approaches were used which included generating and using mood and style boards, brainstorming...
and keywords in addition to visual evaluation and product handling. They explored a range of visual product solutions that would live alongside other products whilst satisfying the target user's needs beyond the functional (e.g. cultural, emotional, aspirational). As this involved a sensitive medical condition, the emotional domain became even more important as research indicates that this condition has a significant impact on the individual's self-esteem. It was vital for each student to focus on a product solution that would convey positive messages about the user to help overcome the product type's stigma.

The exercise was evaluated through collective group feedback, one-to-one discussions and assessment of each student's submission.

Results of case study 2: a summary
What emerged throughout this workshop was that students, though working independently on the brief, tended to share the visual material (mood board, styling board and design concepts) that they displayed within their communal working space (Figure 6). As they presented their final design concepts this cross-fertilization became more evident.

The students concentrated on the emotional needs of the individual through the use of colour, form, size, use of materials and product semantics. As well as designing within the context of use, environment and task, they did utilize their visual resources (mood boards and style boards that were displayed in their environment) to 'feed' their concept generation (from ongoing staff/student discussion).

Case study 1 involved students working individually and concurrently on this and other projects. Typically students would work independently and present their final designs to the wider student group at the end of the designing project. Case study 2 generated an environment that was single project focused and team-based. Though each student chose to explore a particular product solution, they all displayed and shared their visual material. This change in their designing environment (shared space) and only working on one design project at a time created a significant new experience for the sample group. The authors have considered that, due to their unfamiliarity of the product type and medical condition, this in itself may have contributed to a more synergetic effect. The mood boards were shared and it was evident that elements of all mood boards, irrespective of who generated it, began filtering into all the students' design work. Mood boards

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoy generating them</td>
<td>Might start leading in wrong direction too early</td>
</tr>
<tr>
<td>If done properly, you will get good feedback and that will help you</td>
<td>You have to know what emotions you want to convey through the product before you can begin to gather the images together</td>
</tr>
<tr>
<td>They make you think deeper than a product being a product</td>
<td>If you do this to get marks and just slap images down, you don't get anything from it.</td>
</tr>
<tr>
<td>Allows you to collect images by flicking through magazines</td>
<td>Might start leading in wrong direction too early</td>
</tr>
<tr>
<td>Helps you refer back to the images when you need inspiration</td>
<td>Did it right before the hand in, just put on any old thing</td>
</tr>
<tr>
<td>They refresh you during the designing process</td>
<td>Can't see how it helps me</td>
</tr>
</tbody>
</table>

Table 2: Students' views on mood boards.
learning of mood board generation and use at undergraduate level?

Part one: design practitioner perspectives

The survey has shown that the majority of the albeit small but purposive sample of design practitioners used mood boards. They report that boards are valuable for both communication and inspirational purposes.

Communication. The communication element has a number of sub-sets.

a. The respondents referred to designers communicating with other stakeholders. Traditionally, a marketing department would give the designer(s) words and numerical data to work from. Designers tend to be imagers. This indicates that communications to the designer(s) could be enhanced if other stakeholders used images, possibly as a part of mood boards.

b. Mood boards can be used as a team-building and focusing instrument. There are parallels with the concept of 'warm-up' for a design team (Denton, 2002). This refers to the need for a newly formed team to undergo experiences intended to help the members knit together. These exercises can be very different in form from the actual design process they will undertake. Theory and experience in team-building indicates that whilst such work may not appear to be directly productive, it can have a significant and positive effect on subsequent design work (Denton, 1997a, 1997b). The building of a mood board would fulfil the principles of team warm-up.

c. Mood board construction can assist in getting all stakeholders 'on the same wavelength'. With the significant sums of money invested in start-up for projects, it is important to ensure that people are using terms in the same way. This is not an easy thing to do without some form of practical vehicle.
Mood board construction can help provide context for stakeholders. One of the respondents described the difficulty of communicating, for example, possibly intangible concepts such as explaining an appropriate urban trainer (shoe) to a finance director.

In practice, some design consultancies, in the authors' experience, are utilizing mood board 'walls' that offer a more dynamic sensorial experience that evolve over a design project. The whole design team share the collection of images, sounds, textures, and so on. They offer an accessible resource for designers in their own language and, according to one of the respondents, offer a form of record of decision-making that companies are increasingly turning to.

Promoting Innovation. The respondents referred to mood boards as an inspirational tool. This is a difficult concept to measure and to a large extent appeared to be an article of faith amongst those respondents. Here we must again differentiate mood boards from style boards. It is suspected that some of the respondents may have included style board work in their own definition of mood boards. Designers build an internal 'library' of form, texture and colour on the basis of experience and observation. The authors suggest that by using mood and style boards in juxtaposition with this internal library it is possible to provoke new directions and be a source of Inspiration. Also, by externalizing some of this internal library with mood and style boards, the designer's thinking can become more transparent to other stakeholders.

A further possible link with mood boards providing inspiration is through teamworking theory, particularly the concept of synergy. A popular definition is that working together can produce an effect greater than the sum of individual contributions. A more precise definition is that synergy refers to group phenomena which emerge from interaction and affects how well a group is able to deal with a situation (Hackman, 1983). This is a neutral statement allowing synergy to be judged as negative, positive or neutral in terms of performance. By developing a mood board, a team requires and promotes communication. Such discussion between members with different backgrounds and perspectives can, if appropriately handled, promote synergy (Denton, 1997b).

One of the practitioners considered mood boards to be little use for highly functional products such as medical products. The authors' view would be that these contexts are the ideal area for using mood boards. The highly emotional and sensitive context of use for such product demands that designers produce products which are non-threatening, more reassuring and contribute to reducing patient stress.

Although the authors have classified mood boards and style boards as separate entities, in reality the definition of style and mood board is somewhat blurred. In survey 1, one designer in particular mentions the use of boards showing associated products to communicate context considering this to be a mood board. By the authors' definition this would in fact be a style board.

Style boards may encourage lateral thinking by allowing inspiration from other product genres. This approach also helps the designer to build a user profile by associating the target user with existing products. However, as all of the forms/products selected are already produced it can lead to an inbreeding of styles, almost visual plagiarism and may reduce lateral/original thinking in the inexperienced designer. When mood boards are used to support style boards, they may throw some more original ideas into the mix. The research design adopted cannot establish whether the use of mood boards promotes lateral/creative thinking. The authors intend to develop this aspect in further work.
Undergraduate perspectives. Case study 1 reinforced the authors' concerns that students were arriving at university having experienced 'mood boards' at school but that their understanding was very limited. This correlates with the findings from survey 2, which showed 84 per cent had heard of mood boards but only 21 per cent had actually used them as a part of a design project. There are indications that mood boards tend to be conceived and used at a number of levels. It is perfectly possible to produce a mood board without understanding the value and subtlety. The authors' opinion is that it requires careful teaching and maturation before the real value of mood boards can emerge. In case study 1, the task to design an overtly masculine or feminine kettle was in fact fairly straightforward. Any undergraduate would be able to do this from personal experience and the mood board may not have been conceived or used as intended.

Measuring the success of the student design project can be extremely subjective. Are the best designs due to those students being more talented, or due to specific insights derived from mood board use?

Part two: issues relating to teaching and learning

Analysis of the data indicated a number of emerging categories. These include:

- prior experience and learning to construct and use mood boards
- gathering sensory stimuli and constructing the mood board
- the primary functions of inspiration and communication
- training in the use of mood boards at student and professional levels.

These categories are interlinked and will require further exploration. This section will however be based on these emerging categories.

Study 2 triangulated well with case study 1 in that the teaching and learning context was very different. Case study 2 took the students well away from their comfort zone and into an area where they hopefully had little experience (female urinary incontinence). In this case the students were attempting to produce designs that promoted a more positive image for users. It was therefore necessary to seek all the visual stimuli possible in a positive sense. Because the topic and associated imagery were so different to their own experience, unlike the kettles in case study 1, students appeared to actually make more positive use of the mood board in both its conception and use.

Data gathering. Survey 1 highlighted that students encountered mood boards in secondary education. However in the authors' experience of interviewing for undergraduate places, predominantly unrefined style boards represent the use of mood boards at a school level with images collected mostly from one source.

The search for suitable images for mood and style boards potentially encourages designers to investigate a wide range of imagery. The act of searching itself provides an opportunity for emergence of unintended visual directions potentially enriching the design outcome. This may emerge from the juxtapositions of imagery as the designer explores, so presenting directions and stimuli the designer had not already thought of. However, the value of this search is highly dependent on the range of source material collected. Strategies for searching for appropriate imagery appear to be underdeveloped. Some sources of inspiration such as magazines can be biased towards a specific demographic; hence students need a strategy for gathering diverse mood board media.

Figure 7 illustrates one method of using mood boards to promote a wide range of visual investigation. Firstly abstract imagery, relevant to the project area, is...
gathered and analysed. This represents the divergent phase where many visual avenues are explored. The emerging categories would then provide direction for conducting a style investigation through the search and analysis of less abstract, more literal images. The more literal style boards can provide a bridge between the very abstract emotional response generated by mood boards and producing the first concept ideas. Figure 8 demonstrates this as a very linear process. In practice, the mood board and style can often become integrated and be generated concurrently.

Case study 2 showed more appropriate use of mood boards, with a degree of cooperation between the student designers. The sharing of inspirational materials tended to promote fruitful discussions, getting the designers on the same wavelength. This improvement in communication reflects the findings from the practitioners survey, and provides a useful experience of group dynamics.

When boards are generated by a group of stakeholders as opposed to an individual designer there appear to be two levels of operation:

- The collective act of generating the board in a group context may be promoting discussion between stakeholders on some of the less tangible aspects of product design such as subtlety of colour and texture at an early stage of the work. This process may be encouraging a group synergy, much as researchers in that area stress the importance of 'warm-up' exercises prior to group-based design activity.

- Subsequent reference to boards whilst designing and communicating with stakeholders during the whole product development process may offer a method which supports verbal communication, especially amongst 'imager' type individuals.

The data indicates that mood boards tend to be used in a static manner by students. This may be a result of the immediate resources available and the time constraints inherent in a design project; this need not always be the case, however. A website can communicate mood, emotion, essence and context through the use of multimedia techniques. It offers another dimension by which designers can communicate and be inspired through greater immersion in the resource. The use of computer techniques allows a more active development of a mood board during a design process. However, current technologies restrict us to the visual range. Such computer-based mood boards still require the support of tactile media to communicate in the physical world.

Within the teaching and learning environment, evaluating design decision-making in student product work is difficult. Design practitioners report that mood boards can make their thought processes more transparent, providing a justification.
method, and that mood boards offer a way in which responses, emotions, thoughts and aspirations can be captured visually at a point in time. Hence the use of mood boards to log decisions may offer improvements in assessment of student design projects if used alongside existing methods.

This research indicates the need for research and development work on teaching and learning the use of mood boards at undergraduate level. This would include:

- an analysis of the actual use of mood boards by practitioners. This would include concept generation and subsequent communication phases.
- supporting the student designer in critically analysing visual data.
- methods of evaluating the impact of inspirational media (e.g. mood and style boards) in concept generation through to product launch.
- investigating the development of design judgement (Nelson and Stolterman, 2003).
- effective methods of teaching and learning at undergraduate level including professional reflection in building judgement (Schon, 2003).

In the authors' experience, analysing and incorporating the mood and style board material appear to be the main weakness when students use visual research.

CONCLUSION

Mood boards potentially provide the designer with a sensory-centric (i.e. beyond the visual) approach to aid their communication and encourage inspiration/innovation.

The students in the studies tended to generate static mood boards (and style boards) and failed to explore texture and other sensory material. Most employed a tactical learning approach to satisfy a marking scheme rather than support their designing process. A subset demonstrated a sound working knowledge and utilized the mood board as visual resource. This indicates that the teaching and learning of mood boards, their design and use requires further work.

The authors consider that to maximize the potential effect of mood boards, the boards need to be active and grow with the project. In addition, their benefit may be enhanced if they utilize as many senses as possible to aid communication on various levels. They need to offer a complete sensorial experience. The average user will experience the final design outcome, the product, through all the senses. In the future, mood may be captured and communicated by designers through three-dimensional animation with sound and smells. The sensorial experience may help to project the more ethereal aspects to support more effective product development. Nevertheless, the process of generating a mood board needs to be rapid and relative to the overall project time constraints.

Further research is required to establish the effectiveness of mood boards in actually promoting innovative work. At present, both academics and designers report this specific issue in aspirational terms; it has not yet been established whether innovation was improved.

Finally, this work highlights an important aspect of design that has been relatively unreported or researched. A number of relevant directions for further work have been identified and the authors look forward to exploring these areas.

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MOOD BOARDS AS A DESIGN CATALYST AND RESOURCE: RESEARCHING AN UNDER-RESEARCHED AREA

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Deana McDonagh is an Associate Professor of Industrial Design at the University of Illinois (Urbana-Champaign) in America. Her principal areas of research are focus group techniques; the minority voice within the designing process; user involvement within the designing process; the emotional domain within product/industrial design; user-centred design techniques and methodologies including participative user testing, and user evaluation throughout the product development process.

Ian Storer is an Industrial Design lecturer within the Department of Design and Technology at Loughborough University. He is a recognized Industrial Design Consultant with over 10 years' design consultancy experience. He has worked on a diverse range of products, including: powerboats, electric delivery vehicles, fitness equipment, beverage dispensing machines, vacuum cleaners, hand-held consumer products and computer peripherals etc for both blue chip and SME companies. His particular expertise is in styling, brand engineering and product semantics. His current design research areas include product styling and semantics, concept generation and design communication.
(11) McDonagh D and Denton H (2005)
Exploring the degree to which individual students share a common perception of specific mood boards: observations relating to teaching, learning and team-based design. 
Exploring the degree to which individual students share a common perception of specific mood boards: observations relating to teaching, learning and team-based design

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Mood boards offer a visual and sensorial channel of communication and inspiration for design research and development, which could be considered to be more logical and empathic within a design context than traditional verbo-centric approaches. This paper explores individuals' perceptions of images through a sample of mood boards. Gender was chosen as a bipolar attribute and was explored through the specific mood boards. A sample of 62 design students' responses was captured via a rating scale and key words. The paper reflects on the results obtained and attempts to translate findings into suggestions for other academic staff involved in undergraduate industrial design education.

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Mood boards are usually a collection of images compiled with the intention of communicating or provoking a mood or ambience during the product design process. They are often used in both establishing and agreeing an initial ambience for a product with a client and during the design process, as a dynamic resource. As modern product design is more team based (Hoerr, 1989; Lawrence, 1996); how can we be sure that the individual designers and stakeholders in any team perceive a given board in a similar manner? If there are significant differences in perception the team may be pulling in different directions.
The authors decided to explore whether undergraduate design students shared a common perception when viewing specific images. Perceptions of gender provided the focus for this study. Consumer perceptions of a product's 'gender' have been identified as a significant factor in product design (Iyer and Debevec, 1986; Milner and Fodness, 1996). A group of undergraduate industrial designers (n = 62 in the Department of Design and Technology at Loughborough University) produced individual mood boards to reflect either masculinity or femininity as directed without recourse to overtly sexual images. The group as a whole then viewed a sample range of boards and each student rated them on a 10-point scale. The results were entered onto a spreadsheet; the means and standard deviation were calculated. The ten highest rated mood boards for femininity and masculinity are presented.

The results, whilst based on a limited sample, enable discussion relating to teaching and learning issues for industrial design students and the ways in which they may be employed in team-based design. The paper briefly explores some of the limited literature on mood boards. The method used in the study is explained. Results are presented in two tables showing the boards, means and standard deviations. These are then discussed before conclusions are drawn.

1 Background

Product research has tended to present data using verbo-centric methods despite the fact that up to 80% of human communication is non-verbal (Damásio, 1994; Kosslyn, 1994). This may have a significant impact on the way in which designers communicate with other stakeholders in any product design process. For example, designers tend to be 'imagers' rather than 'verbalisers' (Riding and Rayner, 1998). Whilst other stakeholders, such as market researchers, may prefer verbal communication and find images less accessible. This indicates that multiple channels are needed within any on-going design process if effectiveness of communication is to be maximised.

Mood boards are a visual, and may be multi-sensorial (texture, movement, sound) means of communication, which may have value in assisting communication and inspiration during any designing process. They have long been taught to art and design students, but rarely has their use been analysed. They remain largely an item of faith in the design community. They should be distinguished from style boards. Style boards are usually collections of images of manufactured artefacts, which reflect parallel product placement. Which attempt to represent the
type of products that the assumed user would surround themselves with, or represent a style or idealised form that is desirable in the finished product. Whilst the authors refer to two types of boards (mood and style board), Baxter (1995) identifies three types of boards and three sequential stages of use:

- a lifestyle board, which is a collection of images representing target customers' personal and social values.
- a mood board, which he defines as a board that ‘tries to identify a single expression of values for the product’ (Baxter, 1995, p. 222). He illustrates this with examples of single images.
- a visual theme board, which is a collection of images of products, which convey the target mood (i.e. same function as style boards, defined above).

It is recognised that Baxter’s stages are logically funnelled from the broad to the specific. The authors nevertheless consider the first two are better conflated. Baxter suggests that a single image can be sufficient to convey the required mood. The authors consider this an oversimplified approach and rather than a single image, the juxtaposition of multiple images can convey more than the sum of the parts. In addition, textures and even scents could be incorporated to offer a multi-dimensional sensorial experience, which more accurately reflect and respond to modern product design. To some degree this view is supported by Eckert and Stacey (2000) who refer to mood boards as:

Being arranged around one central image which encapsulates the essence of that mood, with others that indicate the scope for interpretations (p. 529).

Note that Eckert and Stacey are focused on ‘images’ and do not refer to textures or scents as possible parts of a functioning mood board. They do refer to possible cultural connotations, and point out that the exclusion of certain visual elements can be revealing. A point that emerges in the discussion of results is given below.

Mood boards have complex and multiple functions. Their primary function is one of inspiration, both for an individual designer and design team. Eckert and Stacey (2000) point out that sources of inspiration play a number of important roles in design thinking: as definitions of context, triggers for idea generation and providing anchors for structuring mental representations. Their secondary function is one of communication. This may support the internal dialogue for the individual designer, and, in addition, dialogue between a team of designers and broader stakeholders in the product development process. This may involve
communicating in an abstract visual way with non-designers, thus opening up a new channel of communication beyond the written and spoken word (Costa et al., 2003).

These two functions are to some extent brought together in the process of gathering and collating sensorial data for a mood board. This can be a valuable step in helping a new design team to gel, agree a common direction and build a shared visual language (Hackman, 1965; Denton, 1997).

The various definitions of mood boards appear to agree that abstraction can be of value. The mechanism may be similar to ambiguity in design sketching which Garner (1992), Eckert and Stacey (2000) and Oxman (2002) consider important for triggering re-interpretation and possibly fresh thinking. Nevertheless, Baxter (1995) has highlighted that over abstraction can limit the effectiveness of the boards. His logic appears to be that individuals within a team may not have a shared global visual language with extreme abstractions. This is a valid point and particularly in a design team where there is a variety of backgrounds, cultures and experience. The authors recognise this point but advocate a more lateral than literal approach to the material chosen, provided that there is a significant balance. At the other extreme, one of the dangers of the style board, with its more overt collection of placement products, is that it can funnel a designer's thinking and be unconsciously constraining.

Looking within an educational context, teaching and learning theory has identified bipolar scales, such as 'wholist/analyst' and 'imager/verbaliser' (Riding and Rayner, 1998). It could be reasonably assumed that mood boards should be perceived as active and developing tools rather than one-off static collections of images. The authors acknowledge that non-designers can and should contribute to mood board development. This is not the sole prerogative of the designer (Bruseberg et al., 2002; McDonagh et al., 2002).

2 Method

Sixty-two second year undergraduate industrial design students (43 males, 19 females) were required as part of an assignment to prepare a mood board to reflect either femininity or masculinity as directed. Each gender group was split so that half produced a feminine board and half a masculine. They were instructed to avoid obviously sexual references but to rely on abstract images and composition/construction to convey the gender intended. The 62 boards were photographed and
50 were randomly chosen and prepared for presentation to the group via a PowerPoint presentation. The boards were mixed randomly and then each presented for 10 s. After each slide 20 s were allowed for a response. Working individually, students scaled each board for gender on a 10-point scale where 10 equalled extremely feminine and 1 extremely masculine. Then each student supplied two key words, which they felt, represented their perception and reaction to the image. This led to a total of 38 key words per image from the females (n = 19) and 86 key words from the males (n = 43). The authors used a simple, direct form of reduction (Cohen et al., 2002; Radnor, 2002), to establish the minimum number of categories of words. For example, soft, gentle, delicate were reduced to soft.

The raw data was entered in a spreadsheet and means and standard deviation (StDev) were established for each board. The range of means was then sorted by the spreadsheet to give a sequential range of boards from the most feminine (highest mean) to most masculine (lowest mean). It is appreciated that the sample size is small to use statistical methods such as StDev, but it is included as it gives some indication to the measure of agreement between the 62 individuals on any one board mean. For example, an StDev lower than 1 indicates a strong agreement between students on a given mean, the closer to zero the more the agreement. An StDev over 1 indicates little agreement.

3 Results
Table I represents the five boards perceived by both male and female students as most feminine. Table 2 represents the five boards perceived as most masculine.

Considering that there were 50 images presented to the student cohort, the group were surprisingly in agreement on the five most masculine and feminine boards. For example, the five boards rated most feminine were identical for both males and females and in almost the same sequence, only the third and fourth choice were reversed in sequence (boards 13 and 19). In the case of the masculine boards, three were common to both male and female respondents and two were unique.

3.1 Highest rated feminine boards
The boards perceived as most feminine were identical for both males and females. Only in the case of the third and fourth choice were two boards reversed in sequence (boards 13 and 19). The board considered most feminine (board 3) also showed the highest agreement both within and between genders with the lowest standard deviation (StDev) at 0.48.
<table>
<thead>
<tr>
<th>Female Responses</th>
<th>Male Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurturing * 2</td>
<td>Board 3</td>
</tr>
<tr>
<td>Pale * 2</td>
<td>Calm * 3</td>
</tr>
<tr>
<td>Soft * 7</td>
<td>Delicate * 3</td>
</tr>
<tr>
<td></td>
<td>板 3</td>
</tr>
<tr>
<td></td>
<td>Most feminine</td>
</tr>
<tr>
<td></td>
<td>Gentile * 2</td>
</tr>
<tr>
<td>Flower * 4</td>
<td>Board 23</td>
</tr>
<tr>
<td>Nature * 2</td>
<td>Calm * 3</td>
</tr>
<tr>
<td>Protective</td>
<td>Cold * 3</td>
</tr>
<tr>
<td></td>
<td>板 23</td>
</tr>
<tr>
<td>Soft/delicate * 13</td>
<td>2nd most feminine</td>
</tr>
<tr>
<td>Weak * 5</td>
<td>Expressive</td>
</tr>
<tr>
<td></td>
<td>Cool/grey * 2</td>
</tr>
<tr>
<td>Calm * 4</td>
<td>Movement/power * 3</td>
</tr>
<tr>
<td>Neutral * 2</td>
<td>Dreamy * 3</td>
</tr>
<tr>
<td>Soft/subtle* 8</td>
<td>Feeling * 2</td>
</tr>
<tr>
<td>Warm * 2</td>
<td>Focused * 5</td>
</tr>
<tr>
<td></td>
<td>3rd most feminine</td>
</tr>
<tr>
<td></td>
<td>Curvy * 12</td>
</tr>
<tr>
<td></td>
<td>Board 13</td>
</tr>
<tr>
<td></td>
<td>Abstract * 5</td>
</tr>
<tr>
<td></td>
<td>3rd most feminine</td>
</tr>
<tr>
<td></td>
<td>Abstract * 5</td>
</tr>
<tr>
<td></td>
<td>Bold * 4</td>
</tr>
<tr>
<td></td>
<td>Harmony * 2</td>
</tr>
<tr>
<td></td>
<td>Organic * 6</td>
</tr>
<tr>
<td></td>
<td>Curvy * 12</td>
</tr>
<tr>
<td></td>
<td>Reflective * 2</td>
</tr>
<tr>
<td></td>
<td>Colourful * 3</td>
</tr>
<tr>
<td></td>
<td>Sensual * 2</td>
</tr>
<tr>
<td></td>
<td>Curvy * 12</td>
</tr>
<tr>
<td></td>
<td>Energetic * 3</td>
</tr>
<tr>
<td></td>
<td>Smooth * 2</td>
</tr>
<tr>
<td></td>
<td>Curvy * 12</td>
</tr>
<tr>
<td></td>
<td>Water/drops * 6</td>
</tr>
</tbody>
</table>

Table 1: Five boards perceived as most feminine.
<table>
<thead>
<tr>
<th>Perception of specific mood boards</th>
<th>Board 13</th>
<th>Board 19</th>
<th>Board 12</th>
<th>Board 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement * 8</td>
<td>Big/bold * 2</td>
<td>Blended * 4</td>
<td>Blurred * 4</td>
<td>Autumn * 2</td>
</tr>
<tr>
<td>Passionate * 2</td>
<td>Calm</td>
<td>Bright * 2</td>
<td>Calming * 5</td>
<td>Burst/busy * 2</td>
</tr>
<tr>
<td>Plain</td>
<td>Colour</td>
<td>4th most feminine</td>
<td>Coloured * 4</td>
<td>Dark * 2</td>
</tr>
<tr>
<td>Smooth</td>
<td>Control</td>
<td>Mean 5.44</td>
<td>Contrast * 2</td>
<td>Deep * 3</td>
</tr>
<tr>
<td>Soft * 3</td>
<td>Curvy * 8</td>
<td>8th most feminine</td>
<td>Curving * 4</td>
<td>Dominant * 7</td>
</tr>
<tr>
<td>Unmoving</td>
<td>Evolving</td>
<td>StDev 0.86</td>
<td>Focused * 7</td>
<td>Elegance * 2</td>
</tr>
<tr>
<td>Mysterious * 2</td>
<td>Busy/complicated * 2</td>
<td>Individual * 2</td>
<td>Floral/organic * 5</td>
<td>Passion * 9</td>
</tr>
<tr>
<td>Romantic</td>
<td>Confident</td>
<td>Natural * 2</td>
<td>Heavy * 2</td>
<td>Red/rich * 6</td>
</tr>
<tr>
<td>Seductive * 3</td>
<td>Dark/deep/danger * 5</td>
<td>Ordered * 2</td>
<td>Warm * 2</td>
<td>Sexual/seduction * 17</td>
</tr>
<tr>
<td>Stereotypical</td>
<td>Elegance</td>
<td>Deep * 3</td>
<td>Elegance * 2</td>
<td>Style * 5</td>
</tr>
<tr>
<td>Strong * 10</td>
<td>Feminine</td>
<td>Dominant * 7</td>
<td>Cloth</td>
<td></td>
</tr>
<tr>
<td>Subtle</td>
<td>Harsh</td>
<td>Elegance * 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thoughtful</td>
<td>Lavish * 2</td>
<td>Floral/organic * 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warmth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean 5.44 | StDev 0.86 | Mean 5.571 | StDev 0.83 | Mean 5.442 | StDev 0.92 |
<table>
<thead>
<tr>
<th>Female Responses</th>
<th>Male Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong * 6</td>
<td>Board 9</td>
</tr>
<tr>
<td>Power * 2</td>
<td></td>
</tr>
<tr>
<td>Explosive * 4</td>
<td>Aggression * 10</td>
</tr>
<tr>
<td>Hard * 2</td>
<td></td>
</tr>
<tr>
<td>Heat * 6</td>
<td>Danger * 5</td>
</tr>
<tr>
<td>Striking * 2</td>
<td>Most masculine</td>
</tr>
<tr>
<td></td>
<td>Bold/tough * 9</td>
</tr>
<tr>
<td>Aquatic * 3</td>
<td>Mean 1.857</td>
</tr>
<tr>
<td>Competitive * 2</td>
<td>Energy/heat * 26</td>
</tr>
<tr>
<td>Motion * 6</td>
<td>Mean 2.11</td>
</tr>
<tr>
<td>Sport * 3</td>
<td>Fitness/power * 9</td>
</tr>
<tr>
<td>Strong * 7</td>
<td>StDev 1.29</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Gentle</td>
<td>Board 24</td>
</tr>
<tr>
<td>Mysterious</td>
<td></td>
</tr>
<tr>
<td>Calm</td>
<td>2nd most masculine</td>
</tr>
<tr>
<td>Dark * 2</td>
<td>Basic * 2</td>
</tr>
<tr>
<td>Calming</td>
<td></td>
</tr>
<tr>
<td>Clear</td>
<td>2nd most masculine</td>
</tr>
<tr>
<td>Moody</td>
<td>Boring/dull * 6</td>
</tr>
<tr>
<td></td>
<td>De-saturated * 3</td>
</tr>
<tr>
<td></td>
<td>Raring-to-go * 2</td>
</tr>
<tr>
<td></td>
<td>Industrial/technical * 9</td>
</tr>
<tr>
<td></td>
<td>Lines * 3</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Abstract * 2</td>
<td>Board 2</td>
</tr>
<tr>
<td>Engineering/structural * 16</td>
<td></td>
</tr>
<tr>
<td>Chattered * 5</td>
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</tr>
<tr>
<td>Colourful * 2</td>
<td>3rd most masculine</td>
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<tr>
<td>Confused * 4</td>
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<tr>
<td>Linear * 6</td>
<td></td>
</tr>
<tr>
<td>Curve * 3</td>
<td></td>
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<tr>
<td>Energy * 7</td>
<td></td>
</tr>
<tr>
<td>Busy * 4</td>
<td></td>
</tr>
<tr>
<td>Individual * 6</td>
<td></td>
</tr>
<tr>
<td>Inventive * 2</td>
<td></td>
</tr>
<tr>
<td>Random * 4</td>
<td></td>
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<tr>
<td>Scenic * 3</td>
<td></td>
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<tr>
<td>Perception of specific mood boards</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td></td>
</tr>
<tr>
<td>Busy * 3</td>
<td>Board 2</td>
</tr>
<tr>
<td>Complex * 2</td>
<td></td>
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<td>Industrial * 5</td>
<td>4th most masculine</td>
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<td>Strong * 5</td>
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<tr>
<td>Structural * 2</td>
<td>Mean 2.42</td>
</tr>
<tr>
<td></td>
<td>StDev 0.96</td>
</tr>
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<td>Blurred * 3</td>
<td>Board 7</td>
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<td>Dark * 7</td>
<td></td>
</tr>
<tr>
<td>Dull * 2</td>
<td>5th most masculine</td>
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<tr>
<td>Mysterious * 8</td>
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<tr>
<td>Scientific * 2</td>
<td>Mean 2.47</td>
</tr>
<tr>
<td>Strength * 3</td>
<td>StDev 0.84</td>
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</tbody>
</table>

- Dark * 7
- Technical
- Transient
- Strength * 3
- Chaos * 2
- Futuristic * 3
- Complex
- Harmony * 2
- Intense * 2
- Distant * 3
for females and 0.49 for males; a significantly higher agreement than other boards. However, the student who created board three (male) has used some literal female images, despite instructions to the contrary. Whereas, other boards did not use literal female images but managed to be perceived as feminine through the use of colour, form, tone and texture. Board 3 was included as there were interesting aspects of composition, construction and detail.

One factor that was extremely noticeable for both male and female respondents was that both the first and fifth choices were identical and represented two, apparently quite different, perceptions of femininity; one pink, soft and fluffy (board 3) and the other being darker, more sophisticated (board 12). Looking more deeply, the words' males used for the two most feminine rated boards (3 and 23) frequently included young and childlike. Whereas, the females did not mention youth but focused on terms such as calm, delicate and floating. This is one example of the word choice showing that males tended to see more categories in an image and that of females were in closer agreement. In this case males saw young and childlike as a dimension of this form of femininity, whereas females did not. For both boards and both genders the StDev was below 1.0 indicating a high level of agreement.

Males in fact, produced the first three boards rated in terms of femininity. Again these males appear to see femininity primarily in a girly way and that both male and female respondents agree.

In contrast, board 12 (refer to Figure 1), as the fifth most feminine perceived board for both genders, was interesting both in terms of the words used and the image itself. In this case a darker, more sophisticated femininity was presented. In this case males frequently used words with sexual and seductive meanings, whereas, females made far fewer sexual references and these tended to be less aggressive. Males used terms like seduction, dominant and passion. Females perceived the same board as representing a mysterious, strong and dark femininity. The creator of the board (female) has, within the image, used some overtly feminine images (ankle, finger and navel). However, there are a number of other images, which convey femininity in an abstract manner (velvet, texture and colour).

Females produced boards 13 and 12 rated as the fourth and fifth most feminine. These two students appear to have a stronger, more sophisticated view of femininity. The StDev for the females on board 12 was 0.61 indicating strong agreement on their perceptions of this
board. The males also rated it fifth with an StDev of 0.83, this represented less agreement than the females, but still well beneath 1.0.

All students perceived board 23 as the second most feminine board. It differed in construction from the others in that it was a collage of torn tissue paper in pastel colours. The board contained no overt images of femininity, unlike some, but it is the authors' opinion that this perceived femininity relied on its pastel colours, soft edges and ovoid form. It is interesting to compare board 19 (third choice by females and fourth choice by males) which also used non-literal images of femininity but used softer edged and pastel images. Therefore, three of the highest rated feminine boards contain ovoid forms. Simple tearing of paper and collage made board 23, whereas 19 used a computer graphics package, with sharp images within the ovoid and diffused outer edges.

3.2 Highest rated masculine boards

Both genders agreed on the most masculine board (board 9) (refer to Figure 2 below). This board had some literal male images despite the briefing they were given to avoid these (e.g. torso, chin, airship shadow). Nevertheless there were also abstract images that could be considered overtly masculine (e.g. flames, wire, rocks). This has a clear linear structure compared to the other collection of images. The student used a strong black line to divide up the images.

On this board females scored a mean of 2.11 and StDev of 1.29. Whilst the males had a mean of 1.86 and StDev of 0.75. This indicates that the females, on the whole, perceived the image as less masculine than the males. The StDev of the female responses at well over 1.0 indicates much less agreement than the males who had an StDev of 0.75.
After identifying the board perceived as most masculine there was far less agreement with the other highest rated boards. Both males and females rated different boards as second most masculine. These boards (24 and 4) have only been rated in the top five by either males or females. These responses are interesting. The females' second board (24) contains literal masculine images (e.g. man rowing, man's face, bird of prey, physical action). The males rated a different board (4) as the second most masculine. This board is interesting in that it is grey, flat and dull. It contains technical type images (e.g. sound mixer, electronic circuit boards, musical instrument). It is almost as if the males perceived it as masculine because it was certainly not feminine, literally by elimination. This finding parallels Eckert and Stacey's (2000) observation that the exclusion of certain visual elements can be revealing.

There is a strong angularity in the boards perceived as most masculine. Though these students also tended to use technical/industrial images
embedded within the overall layout. It was noted that looking across the range, the highest rated boards for masculinity had intense, hot colours (red, orange, yellow). The exception was board 4 which relied upon an almost uniform greyness.

Board 7 (refer to Figure 3) is interesting in that there was significant agreement between males and females as to its rating at fifth most masculine, and both StDevs are below 1.0. It partly achieves its masculinity by eliminating any femininity. Even though this board contains ovoids, they are fairly subliminal. The overall impression is of a fairly strong, dark and moody image. The only literal image is that of a tyre but this is relatively subtle.

3.3 General
As there were 19 female respondents and 43 males, the males generated more words. After the raw lists of words were reduced to basic categories, it was found that the females generated an average of 9.7 categories per image. The males generated 13.6 categories per image. This would
indicate that there was a greater level of agreement between females and that males used a more diverse range of words around any given image.

The boards rated most feminine and masculine are both literal and have high visual impact. This was probably largely because the students who generated these boards failed to follow instructions on the use of 'literal' images. Looking at the words used in response to boards it was apparent, generally, that males tended to include a significant number of literal interpretations with more obvious words (e.g. floral). The females responded with more interpretative words (e.g. calm, dreamy, mysterious). Males appeared to find part of the exercise more challenging. Whether this is due to their interpretation of the images, the vocabulary available to them, or masculine mores is an issue for debate.

4 Discussion

In this part of the paper the authors reflect on the results obtained and attempt to translate findings into suggestions for other academic staff involved in undergraduate industrial design training.

There was a surprising agreement within the sample on perceptions of masculinity and femininity. There was also agreement between the two genders, when looking at the five most masculine and feminine boards. A few images were to some degree literal (e.g. boards 3 and 9), but it was clear that even when abstract forms were used the students were able to differentiate. Analysis of the results indicates that they were using colour, form, tone and texture effectively to convey the desired meaning. For example, in general, soft edges, pastel colours, ovoid forms (even when hinted at) and blending of images all were perceived as overtly feminine. Whereas harsher forms, linearity, darker/hotter colours, metallic, the use of dark/strong dividing lines between images all were perceived as overtly masculine. The ovoid form has a long history in relation to perceptions of femininity. The ovoid form was often used to represent the earth mother in ancient societies (refer to Figure 4).

While softer images and pastel colours were perceived as feminine, there was also a clear bipolar effect in that there was also a separate perception of a more sophisticated femininity. In this case darker, tactile, luxurious images were used and recognised by both genders as feminine. It was interesting to note that the words used by females responding to this board were about strength, whereas males tended to respond with more sexual words (e.g. passion and seduction). Another interesting variant between the genders was that males frequently used youth and young when perceiving the other polar extreme of femininity. Females did not
identify youth with this form of femininity. These findings indicate that rather than a simple bipolar model of masculinity and femininity:

\[ \text{feminine} \quad \rightarrow \quad \text{masculine} \]

the model may be more meaningful as:

**type 1 femininity**

where type 1 equals a young, girly, childlike femininity. Whilst type 2 relates more strongly to woman, sophisticated, confident femininity.

One interesting finding was the creation of an overtly masculine image by the removal of any femininity, rather than the insertion of any
masculinity per se. Board 4 demonstrates this well. The student creating the board has avoided any of the methods of indicating femininity discussed above, but has used greyness and flatness to achieve masculinity rather than the use of darker/hotter colours. There are some 'technical' type images within the board but these are overwhelmed by the grey and flat effect of the whole. Is this a way of creation by elimination? Could it be applied in the design of products to reach specific target users?

It is generally assumed that females are more articulate than males, having a broader vocabulary. The females in this study noticeably generated significantly fewer word categories than males. One would expect that the females with a broader vocabulary would generate more categories. One explanation may be that the females have a more homogeneous perception of any given image than the males. The males tended to be more disparate in their choice of words to express their perceptions. The study showed that the males' choices of words/categories were more descriptive but they did not use emotive words/categories to the same degree as the females. The authors recognise that this area is interesting but requires replication and significant expertise in the field of linguistic analysis.

The construction and composition of these mood boards varied from a simple, physical cut and paste method to the use of computers to import and manipulate images. The study indicates that the construction and composition of the board can have a direct influence upon how it is perceived and interpreted. Relatively inexperienced users of computers do tend to use simple, linear, layouts with sharp image boundaries that, as indicated above, tend to result in a more masculine perception. Those students with experience with graphics packages were more able to generate images that reflect femininity by the use of blending, softer edges and colour balancing.

Baxter (1995) does highlight that over abstraction could impact upon the effectiveness of the boards. A more lateral than literal approach is advocated to the material chosen, and a balance is necessary. However, this does illustrate that further research is necessary in relation to abstraction and effectiveness rather than perception in isolation.

From the authors' experience industrial design undergraduate students often misunderstand mood boards. A survey (conducted by one of the authors) has revealed that out of 110 industrial design students at Loughborough University, whilst 93 had heard of mood boards prior to
joining the degree programme, only 24 had actual experience of constructing them and using them. This is considered a relatively low proportion and subsequent work at a degree level gave the teaching staff the indication that an even smaller number of students actually use them effectively to support their designing. It is the authors' perception that the majority of industrial design students may simply respond tactically to course work requirements for mood boards rather than actually using them effectively.

5 Conclusions
These results provide an indication of the ways in which the sampled students constructed and responded to mood boards. The work requires development and replication, including the exploration of the setting of ambiances far more complex than the apparent bipolar aspect of gender. For example, where the designers wish to achieve a product, which warns of danger, approachability, reliability or for a specific cultural context.

There are growing indications that supra-functionality (social, aspirational, cultural, tribal and even spiritual) in products (Weightman and McDonagh, 2003) is important to purchasers. When presented with similar products in the market place, the purchaser often relies on emotional decision-making (McDonagh-Philp and Lebbon, 2000; McDonagh and Weightman, 2003). Designers and design teams, therefore, need to be able to generate and communicate such supra-functional elements at all times during a design process and within the product itself. Mood boards offer an opportunity to communicate at emotional levels.

Reflecting on the results above it is possible to identify issues, which can inform our teaching of industrial design at an undergraduate level. The concept of mood boards is not an easy one to grasp. Students can respond to the requirement to produce mood boards at a superficial level—surface, rather than deep learning (Entwistle and Ramsden, 1983; Marton and Säljö, 1984). The results indicate the difficulty the males in the sample had with both generating emotive forms and responding to them on an emotional level.

To be effective learning needs to be planned and carefully designed to move from the simple to the complex. Teaching sensitivity to the supra-functional nature of products needs to start early and develop logically. Mood boards are one way to help students bring the supra-function to the fore. Male students, especially, appear to need carefully thought out
teaching strategies to enable them to address these aspects. The
techniques of reflective learning (Brockbank and McGill, 2003) and
reflective practice (Schön, 2003) can assist in helping students to achieve
a deeper level of learning and increasing their sensitivity to the supra-
functional and, more importantly their ability to raise and discuss these
issues in a design team. Hence, the value of this study, in attempting to
explore the degrees of commonality in students' visual perception
highlights the need for a shared sensorial global language.

Experienced designers who use and teach mood boards would claim
they can liberate, inspire and support creativity. In turn users need to
feel that the product has a special meaning for them. This requires
significant empathy, vision and flair by the designer or design team.

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Perception of specific mood boards

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McDonagh D (in press)
Empathic research approaches to support the designer:
A supra-qualitative research for designing model
*Design Issues.*
Empathic research approaches to support the designer: A supra-qualitative research model

Keywords: design activity, empathic understanding, research methods

Introduction

Good products offer the user more than 'a job done'; they provide a satisfying and sensual experience. This builds a bond between the user and product and represents the beginning of brand loyalty, which is an important marketing factor. Such products appeal to increasingly discerning and demanding purchasers for whom ease of use, sound ergonomics and pleasing appearance are minimum expectations: they want more. These additional expectations can be termed as supra-functional needs, the overall effect of sensual, emotive and aspirational factors in relation to owning and using the product. Mainstream products can exude high levels of supra-functionality; the key appears to be post-modern developments in the positioning of designers and users in the designing process.

Supra-functional needs include the less tangible, but no less important, social, tribal, spiritual, aspirational and emotional aspects of the relationship between individuals and the products they use\(^1\). It is worth noting that supra-functionality is distinctive from styling. Where styling is concerned with the aesthetic appearance, colour, material and so on, supra-functionality is more holistic and goes beyond appearance alone. It is important for a product to equally fuse both function and supra-functionality. This illustrates the need for designers, to develop a better, understanding of users needs, experiences and user-product relationships by developing empathy with diverse users. The extent to which designers empathise with users has been termed the designer's *empathic horizon* and can be defined as the individual's range of understanding of user experiences in different contexts\(^2,3\).

The model presented in this paper concentrates on the study of users' experiences and needs. By involving users at various stages, designers gain feedback as their designing process proceeds, leading to greater empathy as the relationship develops. This approach builds on existing user-centred approaches and places a greater emphasis on shared understanding and empathy. In addition to the more objective research approaches, those that tend to focus on measuring the measurable, it is the time to reflect and consider complementary methods that are more interpretative and naturalistic. Such methods place the designer in far more direct contact with users and can develop their abilities to empathise with potential users from diverse different socio-economic groups, whilst improving the capacity to identify the supra-functional needs of each group. The designer also becomes a more involved participant within the investigative process. Designers should not only consume data gathered by others, but they should generate it as well.

This paper presents an emerging model of research for designing:

- Users' experiences;
- User-centred design;
- Conventional (market) research;
- Building on user-centred research approaches by bringing the designer into direct contact with users during the designing process in order to better understand their needs;
- The emerging role of empathic approaches.
Specific objectives of this paper include (i) defining and exploring the concept of an emerging researching for design model (ii) describing the context around which it has developed, including that of supra-functionality (iii) exploring the principles needed in research approaches and methodologies which enable users’ functional and supra-functional needs to be identified and the designer’s empathic horizon to be extended.

This paper begins by exploring user experiences and product meaning. This is followed by the changing role and emphasis the user has within the designing process. Then traditional research approaches are considered. The role of the designer as designer/researcher is discussed in order to support more effective design outcomes. The paper introduces the emerging supra-qualitative researching for design model.

1 Product Design is about user experiences

Stakeholders involved in new product development cannot afford to take the Henry Ford approach, “An American can have a Ford [Model T] in any color as long at it is black.” Products compete in the market place and are designed to attract potential users. When two products are perceived as similar (e.g. cost, function and brand) it tends to be the supra-functional aspects that will impact upon the final purchase decision – which is not always a rational decision-making process. Function or aesthetics alone will not necessarily guarantee a purchase. Products need to reflect and respond to users’ lifestyles and aspirations. Though users will not provide the product solution for designers per se, user involvement during the designing process can sensitise designers to users increasing expectations.

In addition, emerging production strategies (design for variance, mass customisation and customisation) and capabilities (desk top manufacturing) are having a significant impact on current and future product design. Products such as the Smart car, offer a range of interchangeable exterior and interior panels. Such a vehicle can have a colour change within an hour. The use of such modular assembly will facilitate product updating, thus enabling people to repair, refresh or even recycle their products, rather than replace them. This offers designers and users an improved opportunity to finely tune product variants.

Our environments are filled with products that convey messages about the owner. The language of products (product semantics) and the associated messages are contributory factors in user-product relationships, the forming of emotional attachment and product bonding. We all tend to have at least one artefact that has meaning and value beyond its function or intrinsic value. For example, we may keep a leaking kettle or a chipped cup that we use everyday because we are attached to them. The thought of replacing them may never occur as these items satisfy needs beyond the functional. In contrast, we may have functional products that remain unused; they may never see the light of day because a bond and attachment has failed to develop.

Within any culture there are unwritten and unspoken rules that distinguish acceptable from unacceptable behaviour. In certain cultures, emotions tend to be interpreted as irrational and are thought to be so antithetical to thinking that they need to be eliminated to enable clear thinking. However, Gray considers that emotions and cognition conjointly and equally contribute to the control of thought and behaviour. The cultural climate within the research for designing community is beginning to embrace the importance of emotion within the designing process. Users’ wants, needs and desires may be challenging for designers to grasp. Such
subjective phenomena adds further complexity and challenge for the designers in that they "...are asked to translate emotions into products – to give tangible form to elusive experiences". To support such a process, user experience and context needs to be explored and understood more fully.

1.1 Product categories

Riggins\(^3\) has been helpful in classifying everyday products (e.g. exotic, stigma) and the meaning behind how they are displayed within the context of the individual's living space products (e.g. clustering, highlighting). Such classifications are useful starting point as they help identify particular visual cues. It is the user's emotional responses to owning and interacting with such products that can help designers understand the more complex user-product relationships. As we can experience more than one emotion at one point in time, products can overlap more than one category. Equally, their meaning to the owner can be ever changing.

At a micro level, each product 'communicates' a number of discrete messages in the form of colour, signs, texture and form. The user navigates around and through the product using a series of visual, tactical and auditory cues. The language of these visual clues is known as product semantics, and relies on the user's perceptions, previous experience and ability to interpret the product language. A well-designed product should intuitively guide the user for ease of use.

The form of 'communication' established by a designer manipulating the form and aesthetics of a product to improve the supra-functionality is not precise. It may have a general direction - e.g. it is fairly easy to establish a 'feminine to masculine' form - but the more subtle levels beneath that are a more dynamic form of communication and indeed may be unique, based on the individual user's background. Therefore, such attempts by designers to communicate supra-functionality can only work accurately at a gross level (e.g. masculine – feminine or fast – slow), below that we get far more subtle and unique nuances. The vernacular of users' everyday life\(^8,10\) are important and offer invaluable insight into cultural and social frameworks. Everyday experiences, the familiar and the ordinary, need be explored as if unfamiliar and extraordinary. Failure to do so may lead to product opportunities, concept solutions and possibly the users' real needs being overlooked. As users' experience their environments, products and others in a dynamic way, understanding their verbal, visual and material language becomes crucial.

2 User-centred Design: the changing role and emphasis of the user

There is no correct way of designing. There are so many variables that impact the process: the designers and stakeholders involved, the task, the use environment, the product-type being explored and the needs of the target user. A conventional designing process may typically involve the designer receiving a design brief, supported by readily available market research information. Market research can offer useful data, but as designers tend not to be involved in that initial data collection, it should not be relied on solely (this will be discussed later). Designers would begin with concept generation (two and three dimensional sketches, mood boards, style boards), selection, development (appearance models) and refinement (full working models and rendered drawings). Ergonomic data may have been taken from standard
texts and may not be as well matched to the particular context. The potential user would be involved in post-production evaluation. As, by then, significant investment had already been made, only slight amendments would be possible. Though this may be an extreme example, user participation would be largely minimal and often too late in the designing process, leaving designers relatively isolated from the users.

A significant shift within the industrial design domain has been the emphasis and involvement of the user as an on-going resource within the designing process. Designers have moved away from designer-centric to more user-centred approaches\textsuperscript{11, 12, 13, 14, and 15}. This shift has involved more participatory approaches and enabled users to share their experiences and aspirations, which in turn, inspire and guide the designer's decision-making throughout the design process.

The following diagram (Figure 1) illustrates the shift from designer-centred to user-centred. The top level represents designer-focused approaches where the designers place themselves as the expert and may consult with the user towards the final stages of concept refinement, possibly as late as pre-production prototype evaluation. The middle level represents the now familiar, user-centred design approaches, which identify the user as a valuable resource. This level also involves the user within the designing process more explicitly and can begin as early as pre-design brief clarification. The bottom and final stage, represents the current shift away from the 'objective' stance to a more involved participatory and interpretative role of the designer in researching to inform their designing process (this will be discussed later in the paper).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{diagram.png}
\caption{Three stages of integrating the user experience within the designing process}
\end{figure}
3 Traditional Research Approaches

Traditional research can be viewed through three lenses. These include a) scientific and positivist methodologies, b) naturalistic and interpretative methodologies and c) methodologies from critical theory. The scientific and positivist view is that knowledge is real, possible of being transmitted in a tangible form and is seeking universal truths. In contrast to that is the naturalistic and interpretative view that perceives knowledge as experiential, subjective, based on experience and insight, leading it to be unique and essentially personal in nature. Critical theory intends not merely to understand situations and phenomena but to change them.

Depending on the nature of the task, the intended outcomes and their preferences the researcher will choose the most appropriate approach and methods. Table 1 provides an overview of the positivist and interpretative approaches to research. Table 2 highlights the three approaches to research and qualitative strategies of inquiry. For those who view knowledge as personal, subjective and unique, then a naturalistic and interpretative approach would be appropriate. For those who regard knowledge as hard, tangible and objective, then the scientific and positivist approach is more appropriate.

<table>
<thead>
<tr>
<th>Dimensions of Comparison</th>
<th>Positivist (objectivist) Quantitative</th>
<th>Interpretative (subjectivist) qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophical basis</td>
<td>Realism: the world exists and is knowable as it really is.</td>
<td>Idealism: the world exists but different people construe it in very different ways.</td>
</tr>
<tr>
<td>The role of social science</td>
<td>Discovering the universal laws of society and human conduct within it.</td>
<td>Discovering how different people interpret the world in which they live.</td>
</tr>
<tr>
<td>Methods of understanding</td>
<td>Identifying conditions or relationships, which permit the collectivity to exist. Conceiving what these conditions and relationships are.</td>
<td>Interpretation of the subjective meanings which individuals place upon their action. Discovering the subjective rules for such action.</td>
</tr>
<tr>
<td>Theory</td>
<td>A rational edifice built by scientists to explain human behaviour.</td>
<td>Set of meanings which people use to make sense of their world and behaviour within it.</td>
</tr>
<tr>
<td>Research</td>
<td>Experimental or quasi-experimental validation of theory.</td>
<td>The search for meaningful relationships and the discovery of their consequences for action.</td>
</tr>
<tr>
<td>Methodology</td>
<td>Abstraction of reality, especially through mathematic models and quantitative analysis.</td>
<td>The representation of reality for purposes of comparison. Analysis of language and meaning.</td>
</tr>
</tbody>
</table>

Table 1: Based on Barr Greenfield

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### Approaches to Research

<table>
<thead>
<tr>
<th>Approaches</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative</td>
<td>A quantitative approach is one in which the investigator primarily uses post-positivist claims for developing knowledge (i.e. cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiment and surveys, and collects data on predetermined instruments that yield statistical data.</td>
</tr>
<tr>
<td>Qualitative</td>
<td>A qualitative approach is one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives (i.e. the multiple meanings of individual experiences, meanings socially and historically constructed, with an intent of developing a theory or pattern) or advocacy/participatory perspectives (i.e. political, issue-oriented, collaborative, or change oriented) or both. The researcher collects open-ended, emerging data with the primary intent of developing themes from the data.</td>
</tr>
<tr>
<td>Mixed methods</td>
<td>This approach is one in which the researcher tends to base knowledge claims on pragmatic grounds (e.g. consequence-oriented, problem-centred, and pluralistic). It employs strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problems. The data collection also involves gathering both numeric information as well as narrative information to that the final database represents both quantitative and qualitative information.</td>
</tr>
</tbody>
</table>

### Qualitative Strategies of Inquiry

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study</td>
<td>The researcher explores in depth a program, and event, and activity, a process, or one or more individuals.</td>
</tr>
<tr>
<td>Ethnography</td>
<td>An inquiry process carried over a prolonged period of time in a natural setting by collecting primarily observational data.</td>
</tr>
<tr>
<td>Phenomenology</td>
<td>The cognitive reality, which is embodied in the process of subjective human experience, Understanding the 'lived experience' marks phenomenology as a philosophy as well as a method.</td>
</tr>
<tr>
<td>Narrative research</td>
<td>Participants discuss their interpretations of the world in which they live from their own perspective.</td>
</tr>
<tr>
<td>Constructivist grounded theory</td>
<td>Studying people in their natural settings. It assumes the relativism of multiple social realities, recognises the mutual creation of knowledge by the viewer and the viewed, and aims towards interpretative understanding of subject's meanings.</td>
</tr>
</tbody>
</table>

Table 2: Research approaches and qualitative strategies

Social sciences have traditionally used a variety of methods in a 'scientific' manner but also there has been a tendency to measure what is measurable. Emotional reactions have been 'measured' by social scientists using a variety of techniques, though such work can be criticised in terms of its validity: does it measure what it purports to measure? Designers recognise the importance of responding to and integrating users' experiences. This helps to differentiate the more empathic understanding research approach from the more traditional research approaches. Terms such as credibility, trustworthiness, transferability, dependability...
and conformability replace the usual positivist criteria of internal and external validity, reliability, and objectivity\textsuperscript{9}. It must not be overlooked that there are different purposes and ultimately different interpretive outcomes that result from this model for more empathic research approaches.

4 Researching to support the designing process

Not all designers respond well to traditional research approaches. They thrive on being immersed and involved within the designing process. Some designers demonstrate creative leaps through intuitive understanding, that may lead to successful products even though they may have had limited exposure to users. It is doubtful that the iMac would have resulted from extensive market research and user opinion. There are limitations to asking users questions\textsuperscript{36}. Such methods rely on questions being formulated by the researcher and the respondent being able to express them either verbally or in writing. In more interpretative and exploratory approaches, issues and concerns that affect the user may need to be revealed rather than assumed, spoken or written. So why do designers need to embrace research approaches to support their designing processes?

If the designer can work directly with users they can listen to the words, and can tune-in to the subtle context-focus (e.g. body language, the other products the users surround themselves with, murmurs, eye movement). All this can be fed directly into concept development as a 'rich' resource. The following list represents some of the benefits that the author believes can be gained through direct contact with users.

- The process can nourish the designing process.
- Verbal and visual triggers and cues can be identified to guide and inspire the designer.
- Data is raw - unfiltered.
- Everything remains present until the designer selects the most design-relevant data.
- Design judgement is a critical element that non-designers cannot offer.
- It can be rewarding and enjoyable, for both users and designers.
- It can provide connections between designers and users than can run deeper than the data gathered.
- Designers are often the best qualified to elicit design relevant data to support their designing process.
- Visual data can be gathered and 'digested' in real time.
- Reflection in action (i.e. improved professional development).
- Evidence can be captured that supports design decision-making.

However, conducting user research can have its limitations. It can be relatively time and resource consuming. It can take designers away from 'designing'. It also requires significant confidence, skill and expertise to implement it effectively. Designers have a unique role, one of translating the data into information that will become transformed into a tangible artefact. Designers need to dig deeper and gather data that can generate an internal creative process. Prior to conducting in-depth research, they may feel a degree of reluctance towards such activity\textsuperscript{40}, hardly surprising if they were not trained to do it. However, once they are actively involved it can be extremely rewarding and enjoyable for both designers and users. Designers are not mere stylists. They are shaping users' experiences.
4.1 What sort of data do designers need?

Designers need both objective and subjective data. Objective data (e.g. socio-economic, age, anthropometric data) increases knowledge and awareness (yet they say one thing, and do another) but may not necessarily support empathic understanding (they may feel something else) (e.g. how one feels about being tall). Not only may individuals be unaware of their actual feelings but also they may not have the vocabulary to express or communicate them.

Designers deal with 'wicked problems' within a social context. There are literally no right or wrong answers, only effective or ineffective design solutions. Designers need to be solution and user focused rather than problem-focused. Once the design brief has been clarified (Cross 2004), designers embark on researching users' experiences and needs, which feeds the concept generation process. With changing global demographics, user needs, social and cultural influences etc., hard data is important, but it cannot be relied on solely to provide a wider, more holistic view. The most appropriate data for designers may not be possible to gain through traditional quantitative methods. Designers need to reveal what may be subconscious feelings and attitudes of the users to help them experience and 'feel' the supra-functional needs of the users.

Design judgement is based on experience and develops iteratively with reflection. Through more empathic research approaches the designer's skills become more refined. Such involved research activity promotes professional reflection, which contributes to improving the quality of data collection and the reliability of that data. Data analysis and conclusions for qualitative research tend transferable.

Eisner proposes that qualitative research is the search for qualities, the characteristics of our experiences. He identified six features of qualitative research, (i) it should be field focused, (ii) the researcher is an instrument within the activity, (iii) it is interpretative in nature; (iv) it is expressive in language; (v) highly detailed (thick description) and (vi) persuasive. The focus of qualitative research tends to be in the context of everyday life. In contrast, quantitative research tends to focus on quantities that can be measured, in which the researcher is considered objective, interested, but detached from the subject of investigation. Such approaches rely on facts and figures. Hypotheses are tested and knowledge is gained through empirical research.

Triangulation can contribute to authenticity if used properly. Cohen et al. have defined triangulation as '...the use of two or more methods of data collection in the study of some aspect of human behaviour.' Triangulation offers different perspectives and enables the results to be crosschecked. This includes member-checking, obtaining rich and thick description, clarifying the researchers' bias and motivation, gaining perspective from an external auditor, and employing multiple qualitative research methods. As user research is often involved in subjective data, employing multiple methods enable a more in-depth understanding of a particular phenomenon from several perspectives. Assuming that appropriate methods are selected and used, the multiple method approach can help to ensure rigour, breadth and depth and can build confidence in the findings.
5 Empathic approach supports user-centred design

Real experience cannot be substituted. However, appreciation, understanding and empathy can be developed and bring designers closer to users. Experience is not directly related to the amount of time invested in an activity, it is related to the quality of self-learning and reflection by the individual designer. Pursuing a more empathic approach will not necessarily guarantee empathy with users. As with most designing processes, this approach is non-prescriptive or formulaic. What immersion will enable is a clearer appreciation of the user experience and their everyday vernacular. Empathy needs to be nurtured and developed, the familiar will become unfamiliar and new patterns of behaviour will become emerge that might otherwise be overlooked.

5.1 Research methods that support empathic approaches

Empathic design has important methodological implications for design. The following table (3) presents a selection of research approaches and methods for adopting, adaptation and developing by designers to support their own inquiries. This collection of published material provides a comprehensive, but not exhaustive range of approaches and methods employed within the context of product design and development. These methods have been specifically chosen as both academic design researchers and design practitioners have developed them. As designers develop their own research skills they will generate their own tailored methods and variants. Through practice and experience, designers will begin to combine appropriate methods to apply to different contexts.

All methods have limits and limitations. Not only do the research methods need to be accessible, perceived as relevant and worthwhile, but they also need to be designer-friendly. Involving the user within the designing process requires a significant resource commitment. Some designers and their managers may perceive such activity as taking them away from the role of designing. Recruiting the most appropriate participants (purposive sampling) will be time consuming. Data capture equipment may require investment in technical equipment (cameras, camcorders, voice recorders). In addition, helpers may need to be employed to conduct a focus group, which is can be one of the relatively inexpensive methods to employ. These approaches and methods require a certain amount of training, skill, confidence, and ability to analysis the data and transform it into design relevant information. If research is conducted on a superficial level, is it worse than meaningless.

Hofmeester and DeCharon de Saint Germain have produced a valuable publication that has brought together a diverse collection of experimental design research methods. This includes shadowing users, media diaries, and a range of cultural probes, asking participants to gather images and take photographs from their personal environments. This eclectic approach to mixed methods that produce less tangible data than traditional research approaches represents a way forward for designers. Though this paper does not explore in detail how such methods can be applied, the author recognises existing published material that does.
<table>
<thead>
<tr>
<th>Methods</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brainstorming</td>
<td>Participants suspend reality and share thoughts and ideas¹³,⁶⁴.</td>
</tr>
<tr>
<td>Cultural probes</td>
<td>Data gathering method for design inspiration⁵⁶,⁶⁸,⁶⁷.</td>
</tr>
<tr>
<td>Focus group discussion</td>
<td>Eliciting user experience through a group discussion⁶⁵,⁶⁹,⁷⁰.</td>
</tr>
<tr>
<td>Ethnography</td>
<td>Observing everyday life²,⁹,⁶³.</td>
</tr>
<tr>
<td>Mood boards</td>
<td>Collections of abstract images that can help communicate emotions and can provide inspiration⁶⁵,⁶⁶,⁶⁹.</td>
</tr>
<tr>
<td>Nominal group technique</td>
<td>Idea generation through list making¹⁷,⁶⁷.</td>
</tr>
<tr>
<td>Observation</td>
<td>Studying individual members of a culture in depth⁹⁴,⁵⁰.</td>
</tr>
<tr>
<td>Photographic ethnography</td>
<td>Users or designers capture visual data that be interpreted afterwards⁸⁸,⁷⁰.</td>
</tr>
<tr>
<td>Product handling</td>
<td>Exploring products by physically handling them and providing feedback. This method simulates the retail environment¹⁴,⁷².</td>
</tr>
<tr>
<td>Product personality profiling</td>
<td>By imaging a product is a person, the participant provides insight into their cultural and social framework¹¹,⁷².</td>
</tr>
<tr>
<td>Role play</td>
<td>Through performance, characters speak about their worlds, express informed opinions and answer questions¹²,¹¹,⁷⁴.</td>
</tr>
<tr>
<td>Visual evaluation/analysis</td>
<td>This relies on obtaining feedback (and ratings) based on solely visual data (e.g. photograph of product) and simulates web-based or catalogue based purchasing²,⁹⁴,⁷¹.</td>
</tr>
<tr>
<td>User Diaries</td>
<td>Participants record their daily experiences using words and images⁷⁶,⁷⁸.</td>
</tr>
</tbody>
</table>

Table 3: A selection of qualitative methods that can support more empathic research approach

5.2 Empathic research approaches

Empathy is our intuitive ability to identify with other people’s thoughts and feelings – their motivations, emotional, mental models, values, priorities, preferences and inner conflicts.⁵⁰

Designers cannot rely solely on their own experience, education and perspectives. Only a small part of knowledge originates from personal experience¹⁰. They need to be sensitive to the fact that there are boundaries to their understanding, awareness and empathy. This empathic horizon (refer to Figure 2) should be seen as a measure of the individual’s ability to empathise with those beyond their immediate socio/economic group. The empathic horizon can be expanded by reflection, experience and research, enabling to designer to be better able
to be sensitive to the issues of particular groups. Sensitivity to our own limitations encourages a participatory role for the user as the designer explores everyday experiences. It must not be overlooked that undertaking the process of expanding one's knowledge and understanding can involve a degree of discomfort. Taking designers outside their comfort zone is a fundamental part of gaining empathy and real insight. Even if designers are exploring a relatively everyday activity, nothing in life is mundane.

![Empathic horizon diagram](image)

Weber\textsuperscript{16} has recognised two types of subjective understanding (verstehen), (i) rational verstehen (observing behaviour through a description of the action) and (ii) emotional verstehen (it involves grasping the emotional context in which the action took place). Weber states that the emotional verstehen can be "obtained through sympathetic participation in the action"\textsuperscript{16}. As designers become more involved with diverse members of the community, they need to develop their abilities to empathise. Designers are now becoming more involved in researching activities in order to elicit that more elusive interpretative data. Such approaches in Table 4 include, intersubjectivity\textsuperscript{10}, symbolic interactionism\textsuperscript{35}, constructivist grounded theory\textsuperscript{36} and ethnomethodology\textsuperscript{17}.

The emerging supra-qualitative research for design model shares many features with other approaches. It builds on the user-centred model of integrating the user within the designing process to provide more evidence, insight and inspiration for the design team. The emerging model focuses more strongly on the designer not only as designer-researcher, but also as an active participant within the data gathering process. According to Sun Yat Sen (1866-1925) 'To understand is hard. Once one understands, action is easy.' As designers build empathy, it is the view that their designing outcomes will be more meaningful to the user.

The designer's role is changing. It is incorporating research approaches and methods specifically aimed at retrieving design relevant data, which will extend and complement and supplement more usual generic data retrieved by other professional researchers outside the design domain. The International Council of Societies of Industrial Design's (ICSID) proposal for their 2005 conference is calling for a significant change in the way designers think, what designers do and what designers are taught. ICSID has identified the shift in focus from
Design data may well be more sensorial, visual and may need to be gained in surroundings familiar to the user rather than in formal surroundings. Designers have been developing a number of methods that deal with less tangible data, with differing levels of success. The body of knowledge, battery of approaches and emerging methodologies all contribute towards a design discipline with a research pedigree of its own. The industrial designer of the future will not differentiate between conventional design activities (drawing, model making) and research activities (observing users, conducting ethnographic studies), they will perceive them as an integrated whole.

The emerging empathic user research model shares many features with other approaches. It builds on the user-centred model of integrating the user within the designing process to provide more evidence, insight and inspiration for the design team. The emerging model focuses more strongly on the designer not only as designer-researcher, but also as an active participant within the data gathering process. According to Sun Yat Sen (1866-1925) 'To understand is hard. Once one understands, action is easy.' As designers build empathy, it is the view that their designing outcomes will be more meaningful to the user.

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5.3 Supra-qualitative research for designing model

If we accept that individuals may say one thing, do another and possibly feel something else the following table illustrates these three overlapping areas. For designers, empathic understanding takes place within the overlapping area, between do, say and feel (refer to Figure 3). This particular zone underpins the empathic research for designing model, which relies on multiple research methods and active involvement of the designer within the gathering, analysis, and synthesis of the findings. Designers cannot realistically be an objective and/or detached researcher in this process, as it relies upon interpretation and synthesis. Stokrocki perceives interpretation as concerned with uncovering the multi-layered meanings and understanding them more deeply. For designers this all-round approach is key to empathic understanding.
The following model (Figure 3) highlights the involvement of the user within the data collection process. This research approach is grounded in the experiences of the user, which is the essence of qualitative research. Once designers gather the variety of textual, verbal and visual data through in-depth multiple interviews and observation of the user, an incubation period follows that enables the opportunity for the designers to reflect and allow thoughts and feelings to develop. These make take the form of connections, patterns, design triggers and creative thoughts. Unlike the more traditional researcher, designers need to transform the data into information that will form the basis of concept generation. This process involves imagining a design solution/outcome that may transcend what already exists, and may require designers to suspend reality in order to develop more visionary ideas and concepts. What this model concentrates on is the internal dialogue and processing that needs to take place within the designer for empathy and deep understanding to develop.

![Supra-qualitative research for designing model](image)

Through multiple research methods, user data can be captured and translated to reveal a reality that may not be apparent on first analysis. Secondly, through empathic understanding the designer can begin to build the holistic picture that places the user and product within a wider context. Qualitative research does recognise that everyone has a lens through which they view themselves, others and their environment. It is the understanding of these particular views, which offer unique insight for the designer. Thirdly, such views may create even more questions for designers as emerging issues are commonly found throughout the qualitative research process. It is no longer necessary for a designer to base their design decision-making on objective data alone when this research model allows for more subjective, empathic understanding that can help fuel the intuitive creative process. With the shift in users' expectations, needs and aspirations, empathy becomes a necessity rather than a luxury.
6 Conclusion

The emerging supra-qualitative research for designing model and appropriate methodologies are being recognised as complementary and necessary by both academic researchers and design practitioners. This model supports user-centred design and helps to develop it even further than it is generally practiced. Designers need to be sensitive and receptive to their position within the data gathering process. They cannot afford to be passive consumers of data. They must be proactive and creative in generating design relevant information. A closer, more intimate and collaborative form of dialogue needs to be nurtured between designer and user. Research for designing has a future that will nurture and enable designers to concentrate on more empathic data and push the boundaries even further. Laurel[11] refers to this as introducing '...new currents in the ocean of possibility.'

Research for designing cannot be directly compared to traditional scientific inquiry, because it is different, distinctive, and with its own values and levels of 'proof'. Traditional positivist science has encouraged researchers to be detached observers. Empathy cannot be achieved through such approaches. Designers need to be shamelessly involved researchers. Their objectives should not only be to observe, but to play an active role in the process of interpretation and translation of user needs into tangible forms. By designers becoming active participants within the research process, they can begin to develop empathy and make more informed decisions, as if they were the user.

We cannot assume that all designers will embrace the supra-qualitative researching for design model. There will be successful (and unsuccessful) products that are created by a designer-centred process. With increasing user product expectations of products, market sensitivity to supra-functional needs, improved production strategies and capabilities, individual responsive variations of products will soon become the norm. Designers need to embrace user empathy not only to survive commercially but to develop the profession further and ensure the designers' role is a significant one in the future.
References

1. D Weightman and D McDonagh. "In the future, design will be just for you." In the proceedings of the International Conference for Universal Design in Japan 2002 (Conference committee) Yokohama, Japan (Nov 30 – Dec 4 2002): 377-385.


Letters from contributors
To Whom It May Concern

I am writing to confirm that I have collaborated with Deana McDonagh on the following publication(s):


I would also like to confirm her involvement within the creation of the paper(s) as co-author being 33%.


I would also like to confirm her involvement within the creation of the paper(s) as co-author being 50%.


I would also like to confirm her involvement within the creation of the paper(s) as co-author being 50%.


I would also like to confirm her involvement within the creation of the paper(s) as co-author being 50%.


I would also like to confirm her involvement within the creation of the paper(s) as co-author being 50%.

Deana McDonagh did not only contribute to the work, but, since she had produced the project proposal to conduct the research in the first place, produced a significant input into the creation of the underlying ideas and arguments. All papers were created under
her supervision. She contributed essential insights and much detail. Almost all user research sessions were conducted by her, and she was heavily involved in both their preparation and the data analysis. I believe that the above-mentioned papers contributed new knowledge by developing methods for user-centred design that directly support the designers' creative processes. Through application to applied design projects, methods were developed, tested and evaluated. The assessment of their suitability was grounded in a theoretical understanding of creativity.

Yours faithfully

Dr Anne Bruseberg
Dear Sir

Confirmation of contribution to published papers

This is to confirm that Deana McDonagh worked with me on the three papers listed below and that we both contributed an equal amount.

- McDonagh-Philp D and Denton H (1999) Using focus groups to support the designer in the evaluation of existing products: A case study. The Design Journal 2(2) pp 20-31. ISSN 1460 6925

- Denton H and McDonagh D (2003) Using focus group methods to improve students' design project research in schools: drawing parallels from action research at undergraduate level. International Journal of Technology and Design Education. 13 (2) pp.129-144. ISSN 0957 7572

- McDonagh D and Denton H (2005) Exploring the degree to which individual students share a common perception of specific mood boards: observations relating to teaching, learning and team-based design. Design Studies. 26(1) pp 35-53 ISSN: 0142-694X

Yours sincerely

Dr H. G. Denton
Senior Lecturer
Co-authored paper


I’m pleased to confirm that the above named paper was co-authored by Deana McDonagh. Deana contributed 50%. It was published in the International Journal of Art and Design Education in 2001. This is a well regarded, refereed journal in the Art and Design subject field.

The paper was based on some good teaching by Deana regarding the construction and application of mood boards in industrial design. The research was modest in scope but very relevant to our curriculum development at that time. The paper sought to identify the value of this part of the curriculum to undergraduate design students by an analysis of student outputs and discussions with participants.
09 July 2004

To Whom It May Concern

I am writing to confirm that I have collaborated with Deana McDonagh on the following publications:


I would like to confirm her involvement as co-author as being 33% and 25% respectively. It was Deana who developed this innovative approach to investigating the emotional dimension of products and she instigated both papers.

Yours sincerely,

Cheryl Haslam, BSc, PhD, CPsychol, AFBPsS, Professor of Health Psychology
11 April 2003

To Whom It May Concern

I am writing to confirm that I have collaborated with Deana McDonagh on the following publication:


I would also like to confirm her involvement within the creation of the paper as co-author being 50%. Deana’s background research (including literature review) on focus group techniques and her practical experience of using this research methodology were also key to the production of this particular publication.

Yours faithfully

Joe Langford
Ergonomics Consultant
30 June 2004

To Whom It May Concern

I am writing to confirm that I have collaborated with Deana McDonagh on the following publication(s):

McDonagh-Philp D and Lebbon C (2000) The emotional domain in product design. The Design Journal 3(1) pp.31-43. ISSN 1460-6925

I would also like to confirm her involvement within the creation of the paper(s) as co-author being 50%.

This paper was the result of several meetings and discussions in which we developed and structured our argument, bringing together evidence from our respective backgrounds and creating the flow chart which helped illustrate where emotional considerations are part of the design process. We had discussed the potential of working together and bringing our respective strengths and expertise together after meeting at a conference at Loughborough University. We recognised that we had similar interests, though from differing perspectives, and that we could combine our experiences and expertise to discuss the idea of the emotional domain in designing. The process and intellectual input to the paper was shared equally between us. Deana was able to carry out a fresh study, with students, to explore how emotional prompts could influence the appearance of the designed object. My contribution was drawn from work that had already be done as part of a research project at Staffordshire University.

Yours faithfully

Cherie Lebbon Southgate
Regarding the PHD submission by

Deana McDonagh
Associate Professor of Industrial Design
School of Art and Design
University of Illinois (Urbana/Champaign)
128 Art and Design Building
408 East Peabody Drive
Champaign
Illinois 61820, USA

Deana and I made a contribution of 50% each to the paper-

McDonagh D and Storer 1 (2005) Mood boards as a design catalyst and resource: researching an under-researched area. The Design Journal 7(3). ISSN 1460-6925

Best Regards

[Signature]

Ian Storer
May 12, 2005

Dr Bridget Vale
Research Office
Loughborough University
Loughborough
LE11 3TU
England

Dear Sir or Madam

RE: PhD by publication submission

I would like to confirm that Deana McDonagh initiated the following conference paper. We worked on this jointly and she contributed at least 50%.


Please do not hesitate to contact me directly should you require any further information from me.

Yours faithfully,

[Signature]

Professor David Weightman
Director
Dear Deana,

It gives me great pleasure to confirm that you were instrumental in setting up and ensuring the smooth running of the research project that has led to the imminent publication of the paper entitled “Good Vibrations: Do electrical therapeutic massagers work?” in the Ergonomics journal.

You did the original negotiation to obtain a research grant from industry and supervised two Masters students during their contribution to the initial stages. Subsequently you liaised with me in the Department of Health and Social Care at Brunel University in order to set up the interdisciplinary focus groups.

Although it was collaborative research, you were the main driver in the process and this enabled the other authors including myself to contribute and work together effectively in order to reach the desired outcome.

Many thanks for all your hard work.

With best wishes,

Yours sincerely,

Lesley Wilson BSc(Hons) Msc DipCOT CMS PgCert(TLHE)
Lecturer and Course Leader of
BSc(Hons) Occupational Therapy
Part time programme