

Human factors for pleasure in product use

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Traditionally, human factors have tended to concentrate on making products 'usable'—focusing on utilitarian, functional product benefits. This paper reports an interview-based study looking at the issue of 'pleasure' in product use. The study was a 'first pass' at addressing the hedonic and experiential benefits and penalties associated with product use, and at identifying the properties of a product that influence how pleasurable or displeasurable it is to use.

Feelings associated with using pleasurable products included security, confidence, pride, excitement and satisfaction. Displeasurable products, meanwhile, were associated with feelings that included annoyance, anxiety, contempt and frustration. The properties of products that were salient in terms of influencing the level of pleasure/displeasure with a product included features, usability, aesthetics, performance and reliability.

Responses to questions investigating behavioural correlates to pleasure in product use suggested that pleasurable products were used more regularly and that future purchase choices would be affected by the level of pleasure in product use.

It is concluded that the issue of pleasure in product use involves more than usability alone. As the user's representative in the product creation process, the human factors specialist should consider many other factors in order to ensure that the user's experience of product use is maximised. © 1997 Elsevier Science Ltd

Introduction

The importance of user centred design is increasingly being recognised. Perhaps the most significant evidence for this is the growing number of human factors professionals employed both in academia and in industry. Further evidence includes the burgeoning literature addressing issues relating to user centred design, the number of conferences concerned with human factors issues and the use of slogans such as 'ergonomically designed' in product advertisements.

Traditionally, user-centred design has tended to concentrate on 'usability'. Manufacturers increasingly see usability as an area where they can gain advantages over their competitors. This contrasts with the technical side of product development. Many manufacturing processes have now become so sophisticated that any advantages to be gained over competitors in terms of, say, price or product reliability are likely to be marginal (Jordan *et al.*, 1996).

As the products that we use at work and in our homes become increasingly complex, so the issue of usability becomes ever more pertinent. After all, there is no point in presenting users with technically excellent gadgets containing a multitude of potentially useful functions if they can not use them. Users also appear

to be developing an increased awareness of usability issues and seem less and less willing to accept low usability as a price that must be paid for 'technical wizardry'. As users begin to see ease of use as central to product quality, manufacturers have started to respond by incorporating human factors throughout the design process.

Usability

The International Standards Organisation (ISO) define usability as:

"... the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in particular environments." (ISO DIS 9241-11)

Arrival at this definition has been an evolutionary process. The phase 'usability' was probably first coined in the late 1970s or early 1980s. Important contributions came from, amongst others, Eason (1984) and Shackel (1986). The early work on usability tended to concentrate on computer based systems which were used in an office/commercial context. This meant that there was often emphasis on the functional and utilitarian aspects of usability. In the context of the ISO definition this was a focus on the effectiveness and efficiency components of usability. Subsequently, however, usability has

become a central issue in the creation of many consumer products. Here the emphasis has been more on the attitudinal aspects of usability. With these types of products usability in the objective sense may be less important—after all if users have the *impression* that a product is not usable they are likely to be less satisfied with it.

The ISO definition includes 'satisfaction' as the attitudinal component of usability. This is described as referring to the 'comfort and acceptability' of product use. In an earlier definition Shackel (1986) considers that, when interacting with a product, the user should be operating within '... acceptable levels of human cost in terms of tiredness, discomfort, frustration and personal effort.'

It would appear, then, that the attitudinal component of usability is concerned with avoiding negative feelings rather than producing overtly positive emotions. For example, usability as a concept does not seem to include feelings such as, e.g. pride, excitement or surprise in its attitudinal component. It could, perhaps, be argued that this is simply a matter of linguistic interpretation and that there is no reason why 'satisfaction' should not be interpreted as covering these positive emotions. However, even if this were so, such a broad interpretation of the concept of 'satisfaction' is certainly not reflected in traditional human factors practice. Indeed, this author cannot recall any human factors literature which reports on a explicit investigation of whether or not a product engendered feelings such as pride, excitement or surprise.

Pleasure and displeasure

Creating *usable* products may not mean the same thing as creating *pleasurable* products. It could be, then, that usability is not a factor in determining how pleasurable products are to use, or that it is merely one of a number of factors. It is, of course, also possible that usability and pleasure in product use are directly equated, and that making a product usable will guarantee that it is a pleasure to use. If they are not directly equated, however, then by considering user-centred design only in terms of usability, products will fall short of offering optimal experiences for the users. It could be argued, then, that as the users' representative in the product creation process, the human factors specialist should consider not only usability, but also other issues that effect how pleasurable a product will be to use.

Jordan (1996) defines pleasure and displeasure in product use as follows:

Pleasure in product use: the emotional and hedonic benefits associated with product use.

Displeasure in product use: the emotional and hedonic penalties associated with product use.

This paper reports an interview-based study intended as a general preliminary investigation of the issue of pleasure in product use—the emotions elicited by pleasurable and displeasurable products, the properties of products that were associated with pleasure or displeasure in use, and behavioural correlates to pleasure or displeasure in product use.

The study

Aims

This study was a 'first pass' at investigating the issue of pleasure in product use. There were three main aims:

- to identify the emotions that are engendered by the use of particularly pleasurable or particularly displeasurable products,
- to identify the properties of a product which can contribute to making it particularly pleasurable or particularly displeasurable to use.
- to identify behavioural correlates to pleasure in product use.

Method

Eighteen participants (10 female, eight male) responded to a semi-structured interview. The vast majority of these were students of less than 25 years. All participants were residents of Glasgow in Scotland.

A few days before the interviews the participants were contacted and asked to consider two products which they owned or used (or had previously owned or used), one of which was particularly pleasurable to use and the other of which was particularly displeasurable. In the interview, which lasted about 1 h, they were asked a series of questions about these—these questions covered the feelings engendered by the products, the aspects of design which made the products particularly pleasurable or displeasurable, and the effects of pleasure or displeasure on usage patterns and future purchase behaviour. A full list of the questions asked is given in *Table 1*.

Results and discussion

Pleasurable and displeasurable products

A summary of products chosen as being particularly pleasurable or displeasurable is shown in *Figure 1* (responses to questions A1 and B1).

Table 1 Interview questions

(A) Pleasurable product

- (1) Think of a product that you either do, or used, to own or use, which gives or gave you a great deal of pleasure.
- (2) Give a general description of this.
- (3) Which aspects of the design are particularly appealing?
- (4) What types of feeling does this product engender?
- (5) When do you experience these feelings?

(B) Displeasurable product

- (1) Think of a product that you either do or used to own or use which gives or gave you a great deal of displeasure.
- (2) Give a general description of this.
- (3) Which aspects of design are particularly unappealing?
- (4) What types of feeling does this product engender?
- (5) When do you experience these feelings?

(C) General questions

- (1) How does associated pleasure/displeasure affect how often you use a particular product?
- (2) How does associated pleasure/displeasure with a product affect your future purchase choices?
- (3) Is pleasure/displeasure with a product connected to the nature of the associated tasks?
- (4) When did it become apparent how pleasurable/displeasurable these products were?
- (5) What advice would you give to designers aiming to produce pleasurable products?

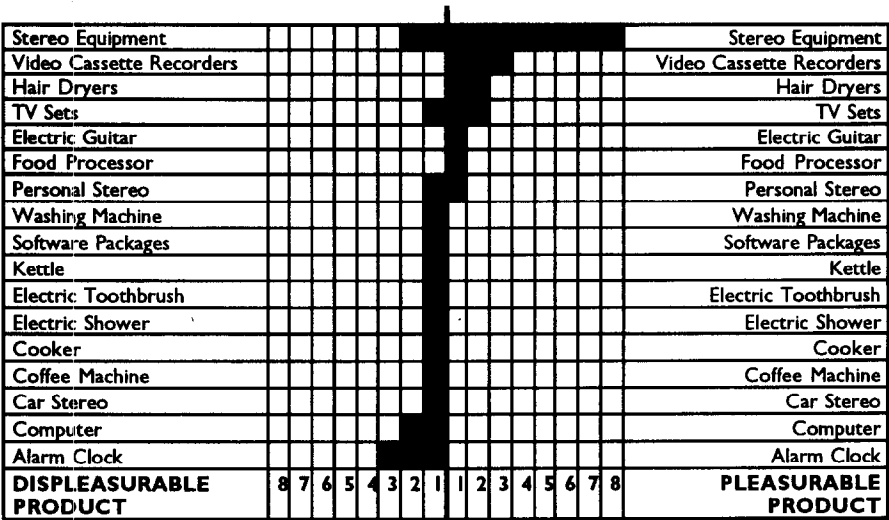


Figure 1 Number of respondents choosing each product type as particularly pleasurable or displeasurable

General product descriptions

The second question (A2 and B2) relating to each of the selected products was asked to see if users would volunteer anything about the emotions associated with products, or the properties of products, that were most important to them without being specifically asked. However, the vast majority of participants simply tried to give factual descriptions of their products, thus little arose from the question which was of interest in the context of this study.

Emotions associated with pleasurable and displeasurable products

Analysing responses to questions A4 and B4 required interpreting the semantics used by participants. For example, if participants said that they 'found it thrilling' to use a product, this would be interpreted as 'excitement'. In some cases the analyst regarded different responses as referring to the same emotion. So, for example, if a respondent were to have said that a product invoked 'sentiment' then this would have been regarded as being the same as 'nostalgia'. The analyst's (i.e. this author's) coding of responses was checked by a colleague with a similar professional background. The categories of emotions identified were not based on previous work in the area—indeed there

is virtually no human factors work reported on these issues. Rather, they were derived from the responses of these interviewees.

Most respondents mentioned more than one emotion in connection with each of their products. The emotions associated with pleasurable and displeasurable products are summarised in Figure 2.

Some examples of the pleasurable and displeasurable experiences with products that were reported are given below:

Pleasurable feelings

Security. Users liked to know that the product was there when needed and that it could be depended upon to give them enjoyment. For example, a stereo user felt secure in the knowledge that he had a good quality and reliable stereo. This meant that he could look forward to his leisure time, sure in the knowledge that he had something enjoyable to do.

Confidence. Feelings of confidence were engendered by using pleasurable products—both confidence during use of the product (e.g. confidence from feeling in control of the interaction) and user self-confidence after use. For example, the user of a hairdryer had confidence in her appearance after using it to style her hair.

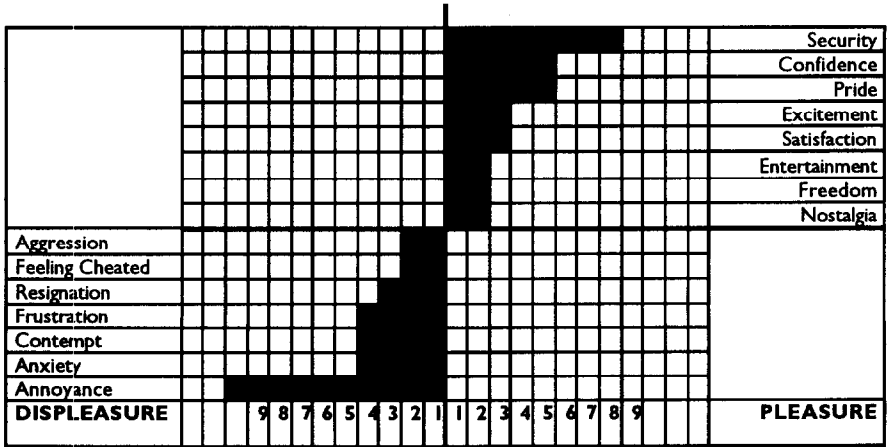


Figure 2 Number of respondents linking feelings with pleasurable/displeasurable products (n = 18)

Pride. If a product turned out to be particularly pleasurable, users would often experience feelings of pride for having chosen to purchase it. Sometimes this sense of pride was heightened if their product was highly rated by their peers. For example, a guitar player was proud of his electric guitar, as he felt that fellow guitar players would recognise its qualities.

Excitement. Some interviewees found their pleasurable product exciting to use, or even exciting to anticipate using. For example, a radio owner felt excited at the prospect of tuning into an hour or so of talk radio after he had finished his day's work.

Satisfaction. This is a more 'background' type of emotion, which is already recognised as falling within the bounds of usability. This seems to have been associated with products that were pleasurable in that they caused the user no bother, rather than because they were positively cherished. For example, a TV user was satisfied with her TV—saying that she was able to take it for granted because it never caused her problems and thus was unintrusive.

Entertainment. A couple of interviewees mentioned that if a product's associated task was entertaining, this could make it pleasurable. For example, a user found her VCR pleasurable as she enjoyed watching entertaining films on it.

Freedom. A feeling of freedom was associated with some pleasurable products. For example, the user of a CD player enjoyed listening to CDs whilst doing household chores. This made an inherently unpleasant time more enjoyable, freeing the person from a sense of drudgery.

Nostalgia. Some products were pleasurable because of the 'history' attached to them. For example, a user was 'attached' to his stereo as he remembered the care he had taken in purchasing it and was pleased that he had made such a good choice.

Displeasurable feelings

Aggression. Sometimes users would feel aggressive towards their displeasurable products. One interviewee reported that she would thump her stereo from time to time, for example if it had 'chewed up' one of her cassette tapes.

Feeling cheated. A couple of interviewees said that their displeasurable product left them with a feeling of having been cheated by those who manufactured or sold the displeasurable product. For example, an interviewee who had had many problems with an electronic shower said that he felt cheated by the manufacturers.

Resignation. Like aggression, resignation appeared to be a feeling that could develop after the user had gone through a stage of feeling frustrated. With aggression the user would turn his or her frustration against the product, whereas with resignation, they would get so frustrated with a product that they would simply try to accept it in order to minimise the negative feelings that they experienced. For example, one interviewee said

that she finally became resigned to her car stereo being difficult to use.

Frustration. Four respondents reported having this response to displeasurable products. For example, one respondent had become frustrated with a software package which he regarded as being unusable.

Contempt. This was directed either at the product itself or at the manufacturer of the product that was displeasurable. One respondent had had to take a kettle back to the shop on two separate occasions as it had been faulty when purchased. This had led her to develop 'mild disgust' with the manufacturers.

Anxiety. Feelings of anxiety and insecurity could arise when users were dependent on a product to complete a task, but felt that the product did not support them as it should. For example, one respondent had problems using her personal computer, which she regarded as being unpredictable and not usable.

Annoyance. This was the feeling most commonly associated with displeasurable products. For example, the user of an alarm clock found the buzz tone irritating and would have preferred a more 'gentle' sound. Similarly, the owner of an electric cooker was irritated that it took so long to heat up.

In addition to the feelings listed in the table, there were nine positive and four negative feelings that were mentioned on a one-off basis. Positive feelings included escapism and mental stimulation, whilst negative feelings included pessimism and disappointment.

When these emotions are felt

The vast majority of responses to questions A5 and B5 indicated that users experienced the emotions associated with their pleasurable and displeasurable products during usage. However, a significant minority also experienced these feelings before and after use of the products. Note that it appears that negative emotions were more likely to linger after use of displeasurable products, than positive feelings after the use of pleasurable products (see Figure 3).

The 'other times' category included, for example, those who experienced the feelings associated with a product when they thought about the product or when they saw it.

Properties associated with pleasurable/displeasurable products

Figure 4 lists the properties associated with pleasurable and displeasurable products (compiled on the basis of responses to questions A3 and B3). As with the feelings associated with these products, the analyst put responses into the categories listed based on his interpretation of what interviewees had said (again these categories were checked by a colleague of a similar background). For example, if a respondent had said that he or she 'liked the appearance' of a product, this would be interpreted as relating to aesthetics. Again, responses that were considered to be similar were also combined. Thus, for example, comments including the word 'features' were regarded as referring to the same thing as comments about 'functionality'.

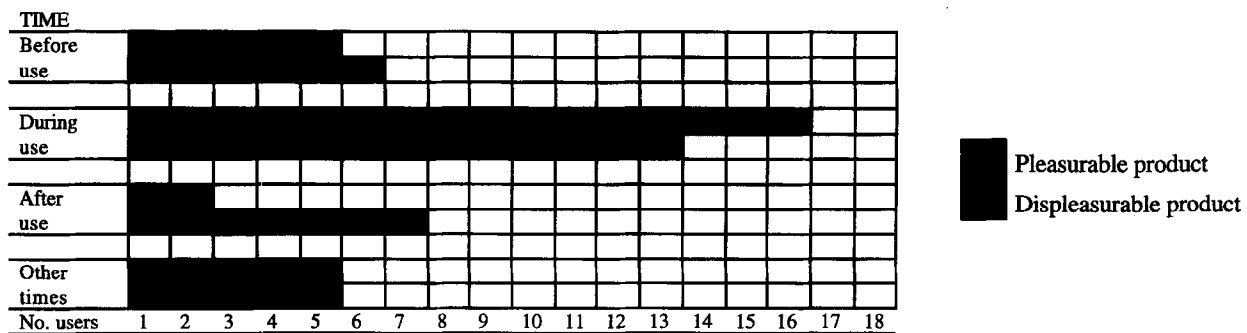


Figure 3 Times when emotions associated with pleasurable and displeasurable products are experienced ($n=18$). (Based on responses to question B5)

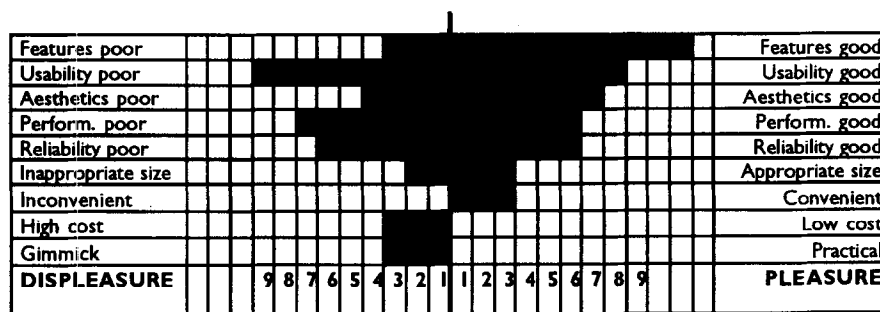


Figure 4 Number of respondents associating product attributes with pleasure/displeasure ($n=18$)

Figure 4 is laid out such that the contribution of a particular property dimension to both pleasure and displeasure can be seen. So, for example, good aesthetics contributed to the positive feelings associated with seven of the pleasurable products, whilst poor aesthetics contributed to the negative feelings associated with four of the displeasurable products.

Examples of where these attributes were important are given below:

Features. This was the issue most commonly mentioned in association with pleasurable products—helpful features supporting the operation of the product. For example, a stereo user was pleased to have a turntable, tape player and CD player in a single unit. Some people simply commented that their pleasurable product contained the appropriate features to do what it was supposed to do efficiently. However, if the product contained unnecessary features or did not have sufficient features, this could lead to it being perceived as displeasurable.

Usability. Usability seemed to be a major issue, both as a contributor to pleasure and as a factor whose absence might cause displeasure. An example from those that mentioned usability was a VCR user who was pleased because it was easy to understand what each button did. Similarly, a stereo owner was pleased because controls were laid out in a helpful way. On the other hand, the user of a computer found the machine 'daunting' because of its lack of usability. Similarly, the user of a car stereo became 'exasperated' at the lack of usability of the radio tuner.

Aesthetics. Appearance strongly contributed to the pleasure which some users took in their products.

Both style and colour were important to users. For example, a stereo user insisted that he would not buy a stereo unless it was black. The owner of a CD player was pleased at how well it blended into the layout of her room. Equally, lack of aesthetic appeal could contribute to making a product displeasurable to use. For example, the owner of a radio-alarm clock found it displeasurable chiefly because it was 'ugly'.

Performance. This refers to a product performing its primary task to a particularly high level. For example, a number of stereo users remarked that they derived pleasure from the particularly good sound quality of their systems. Conversely, the user of a TV set found it displeasurable because the sound quality was poor.

Reliability. Reliability is central to enabling users to form a 'bond' with a product. Interviewees indicated that they had become attached to products which had given them years of good service. For example, the user of a hairdryer had, so far, had 11 years of reliable usage from it. She had become attached to the dryer as using it had become very much a part of her routine before going out. Unreliable products could leave the user feeling cheated. For example, the owner of a personal stereo felt cheated when the stereo proved unreliable.

Convenience. Some products gave pleasure though their convenience—being particularly appropriate for certain contexts of use. For example, the user of a CD player enjoyed being able to leave a CD playing for a while whilst doing other things. This was more convenient for him than listening to tapes or records, as these would have had to be turned over half way through an album.

Size. Three people mentioned that the size of their pleasurable product was optimal—either in the respect of enhancing the product's performance or in terms of suiting the product's context of use. For example, a TV user particularly liked having a big screen. Conversely, the user of a CD player was pleased that the player was compact so that it did not take up too much space in her room.

Cost. The level of negative feeling associated with displeasurable products could be exacerbated if the product had been expensive to buy in the first place. For example, the owner of the unreliable personal stereo (mentioned above under 'reliability') was particularly annoyed because the stereo had been expensive. No one mentioned low cost as a contributing factor to making a product pleasurable.

Gimmick. Products could be regarded as displeasurable because they were seen as being 'gimmicks'. For example, one interviewee, who chose an electric toothbrush as her displeasurable product said that she found the whole concept of electric toothbrushes 'ridiculous'.

There were a series of other properties of a product that were only mentioned either once or twice which were associated with pleasurable or displeasurable products—14 associated with displeasurable products and 10 associated with pleasurable products. These included, for example, 'unpredictability' (displeasurable products) and 'good brand name' (pleasurable product).

Behavioural correlates to pleasure in product use

Pleasure/displeasure and regularity of product usage. Not surprisingly, responses indicated a link between how pleasurable a product was to use and how often it was used. Pleasurable products were used more than they would be otherwise and displeasurable products less often. Question C1 was included to investigate this.

With respect to use of pleasurable products 14 of the 18 respondents said that they used the product more than they would otherwise because of the pleasure that they got from using it—four said that it made no difference. With respect to displeasurable products 13 respondents said they used the product less because it was displeasurable to use, whilst five said that the displeasurability did not affect the amount of usage.

Effect on future purchase choices. When asking about purchasing behaviour, it is difficult to make predictions about the validity of interviewees' replies. After all, it may be one thing to talk about the principle and logic of making a purchase choice, but quite another to decide what to buy at the time of purchase (Jordan and Thomas, 1995). Nevertheless, it is interesting to find out what users have to say about how their experiences with pleasurable or displeasurable products would affect their purchase choices. Even if the purchase process has many 'illogical' aspects to it, logic usually plays some role. The responses to question C2 should, then, give some indication of the way in which pleasurable or displeasurable experiences with a product affect the 'logical' thoughts that go into a purchase decision.

The most common responses, with respect to both pleasurable and displeasurable products, indicated that the product would be used as a benchmark against which future purchase choices could be judged. So if the product was particularly pleasurable to use, then when making his or her next purchase choice with respect to that type of product, the user would look for a product that exhibited similar properties to the pleasurable product. Conversely, if buying a product of the same type as one with which they had experienced displeasure, then they would want to be sure that the product that they were buying did not exhibit similar properties to the displeasurable one. Nine respondents indicated that they would use their pleasurable product as a benchmark for a purchase decision and six said that they would use their displeasurable product as a 'negative benchmark'.

Other responses with respect to pleasurable products were that the respondent would be biased in favour of buying the same brand of product (seven respondents) or would definitely buy the same brand (five). Four respondents said that when they came to replace their pleasurable product they would buy something that was identical.

With respect to displeasurable products, other responses included not buying the same type of product again (four) [so, e.g. if the displeasurable product was a computer the respondent might never buy another computer], not buying anything from the same manufacturer (four), being put off the manufacturer (three) or avoiding an identical product (three).

Even accepting the cautions that must be observed when considering the validity of statements about purchase behaviour, these responses indicate that pleasure in product use is likely to have an effect on future purchase choice, and that manufacturers can expect commercial benefits or penalties, depending upon whether or not their product is pleasurable to use.

Relation between pleasure/displeasure in product use and the associated task

Question C3 was asked to investigate whether or not pleasure in product use was dependent, per se, on the task for which the product was used.

Responses indicated that this was not necessarily so. With respect to both their pleasurable and displeasurable products, respondents rated the vast majority of associated tasks as being inherently pleasurable (the tasks associated with 14 of the pleasurable products and 13 of the displeasurable products). Only in the case of four of the pleasurable products and five of the displeasurable products was the task regarded as inherently displeasurable.

That some of the 'pleasurable' products were associated with inherently disliked tasks and some of the 'displeasurable' products were associated with inherently liked tasks suggests that product pleasurability/displeasurability can be task independent. This lends support to the idea that pleasure in product use is an issue that is conceptually separate and sometimes independent from the issue of how inherently pleasant or unpleasant the task associated with the product is. It seems, from the point

of view of the majority of respondents, that pleasurable products were ones which facilitated enhanced enjoyment of inherently pleasurable tasks, whereas displeasurable products were ones which spoil the enjoyment of what would otherwise have been pleasurable tasks. The question of whether or not products associated with inherently displeasurable tasks can be a pleasure to use is, perhaps, more open, with only four respondents picking pleasurable products associated with displeasurable tasks.

Speed of forming an impression about the product

Question C4 was asked in order to gain an impression of how much exposure interviewees had had to their pleasurable and displeasurable products before they first formed the opinion that the products were particularly pleasurable or displeasurable to use.

Responses are summarised in *Figure 5*.

It appears from this data that users formed their opinions about their pleasurable products more quickly than they formed their opinions about displeasurable products. This is, perhaps, not surprising. After all people presumably do not purchase products with the expectation that they will be displeasurable to use. Thus, with displeasurable products the user may become increasingly disenchanted with the product over a period of time—for example when it becomes apparent that some aspect of the product's performance is poor or some fault develops in the product. Displeasure, then, develops as the user's initial expectations of the product are repudiated.

With pleasurable products, half of those interviewed said that it was apparent to them that the product was pleasurable even before they had used it. This implies, then, that they had a positive feeling about the product from the start and that this opinion has not changed as a consequence of usage. However, for the other half of those interviewed, the level of pleasure associated with the product did not become apparent until after (at least some) use.

These responses indicate that the product's 'face value' properties (e.g. perceived usability, perceived performance) may be important in addition to the 'actual' properties discovered during use.

Advice about creating pleasurable products

The final question (C5) was included in order to give the interviewees a chance to give their opinions directly

as to what those involved in product creation should attend to in order to produce pleasurable products.

Again, the analyst had to make judgements about the issues which the interviewees were referring to based on their verbalisations. These appeared to indicate that users' concerns fell into four main categories—usability (by far the most commonly mentioned), features, quality of manufacture and aesthetics. So, for example, 'make the product easy to use' or 'design user friendly manuals' would have been regarded as referring to 'usability', whilst 'make the product so that it looks nice' would be regarded as referring to 'aesthetics'. 'Quality of manufacture' was taken as covering statements such as 'don't make the product too flimsy', 'make the product reliable'. 'Features' covered issues such as 'concentrate on the main function' and 'leave out unnecessary features'. Most respondents mentioned more than one issue.

Responses are summarised in *Figure 6*.

There were another eight issues that received one-off mentions. These included after sales service and integrity in advertising the product.

Interestingly, of the seven respondents who mentioned functionality as an issue, six were primarily concerned that the product should not include excessive or unnecessary functionality. Only one said that those involved in product creation should avoid limiting functionality.

Responses here mirror those to questions A3 and B3 to a large extent. Again, the indication is that users regard usability as being important, but that there are other issues that need to be addressed in order to create pleasurable products.

Limitations of the study

Perhaps the most obvious limitation on the study comes from the sample that participated in the interviews. As well as being small, the sample was also rather narrow in terms of age and education level. Certainly, then, there is no guarantee that the results of this study would generalise to a wider population.

There are also potential limitations to the accuracy of the data analysis. The analysts (the author and a colleague) categorised the responses according to their 'view of the world' rather than according to any particular model of possible emotional responses or of design properties. Surprisingly, perhaps, there appears to be have been very little systematic study of emotions by psychologists (Plutchik, 1994). Similarly, although

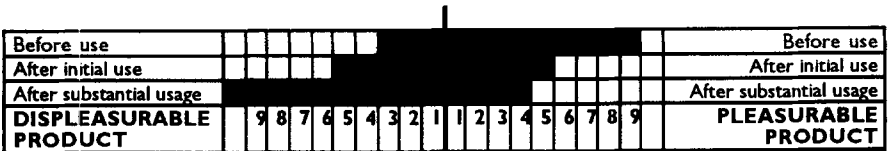


Figure 5 Time after which respondents became convinced of the pleurability or displeurability of their products ($n = 18$)

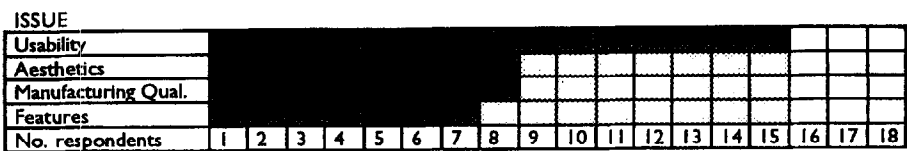


Figure 6 Respondents recommendations about issues upon which to concentrate in order to create pleasurable products ($n = 18$)

marketing research has been able to show that certain properties are important in contributing to the sales of particular types of products, a definitive and exhaustive list of product properties could not be found. Because the analysts are human factors/psychology professionals working in a design department, it might be hoped that they have some 'expertise' in both of these issues. However, this does not make the classification scheme 'definitive'.

The open-ended nature of the questions is also a limitation in itself. When asked about the feelings and properties associated with pleasurable and displeasurable products, respondents may have found that some responses came to mind more easily than others and that some were more easy than others to articulate. For example, it may be that, e.g. issues to do with a product's features come to mind more quickly than issues about, e.g. aesthetics. There seems no reason per se to believe that this is actually so, however this sort of effect is possible and must, therefore, be considered. Similarly, it may be that respondents can articulate feelings of, e.g. 'annoyance' more easily than feelings of, e.g. 'nostalgia'. Thus, it may not be valid to treat the number of mentions that each property and emotion received as a reflection of its comparative importance.

Implications for human factors in product creation

Despite the limitations it seems clear from the outcomes of the study that the issue of pleasure in product use goes beyond usability. Usability, whilst very important, was one of several properties of a product that influenced how pleasurable the product was to use. Similarly, the positive and negative feelings that can be associated with product use go beyond those of satisfaction and dissatisfaction.

This suggests, then, that as users' representatives in the product creation process, human factors specialists should concern themselves with wider issues than just usability. The integration of human factors throughout the product creation process is something which appears to be becoming more and more common within manufacturing organisations (Jordan *et al.*, 1996). However, if human factors specialists concern themselves with only usability issues, then they will not—in all probability—be fully addressing the users' needs. In order that this can be achieved, human factors specialists must address issues, such as aesthetics, that they would previously not have become involved with.

This may mean, for example, understanding the link between particular aesthetic properties, such as colour and particular emotional responses. Similarly, particular emotional responses may be associated with particular types of 'form language'. Human factors, as a profession, may have to develop a better understanding of aesthetics and the classification of products in terms of aesthetic properties in order that such issues can be addressed.

There may also be a need for human factors specialists to become involved in new ways with other disciplines. For example, with marketing and sales, in order to address the issue of pricing products, or with those on the technical side of product development in order to assess what the user would regard as acceptable levels of reliability.

Implications for human factors research

Of course, implementing a wider role for human factors in the product creation process would necessitate a broadening of the issues to be tackled in human factors research. Perhaps an immediate direction for future research might be follow up studies to the one reported here, with systematic investigations of the comparative importance of the various properties that can contribute to making a product pleasurable. The link between particular emotions experienced during product use and the properties of products is also an important direction, i.e. given that it is an aim that a product induces specific emotions in a user, to what aspects of the product must particular attention be paid? This type of research could move towards developing both sets of general principles and sets of low level guidelines for creating pleasurable products.

General principles might be, for example, that if a product is to be a pleasure to use, then it is important that those creating it focus on, e.g. usability, features, aesthetics, reliability and performance. Low-level issues might include properties such as the specific colour that should be used to achieve a particular experiential effect (as a low level property of aesthetics) or the number of times that it would be acceptable for a product to require maintenance over a five year period (as a low level property of reliability). This would parallel the general principles and guidelines that currently exist with respect to designing for usability. For example, Ravden and Johnson (1989) describe a number of general principles of design for usability, e.g. consistency and compatibility, whilst also outlining the specific issues that need to be addressed if these principles are to be achieved.

Similarly, research would also be necessary in order to support the evaluation of products in terms of how pleasurable or displeasurable they are to use. This could involve the development of tools which measure the level of pleasure or displeasure associated with product use. Currently, there are a number of 'off-the-shelf' tools available for measuring user satisfaction {these include, for example, the Software Usability Measurement Inventory (SUMI) [Kirakowski and Corbett, 1988] and the Questionnaire for User Interface Satisfaction (QUIS) [Chin *et al.*, 1988]}. As human factors move towards the investigation of pleasure in a wider sense, it would be beneficial to develop tools that can be used to measure other feelings, e.g. pride or excitement, that tend not to be covered by currently available tools.

Conclusions

Usability is a central factor in whether or not a product is pleasurable to use. However, the issue of pleasure in product use also goes significantly beyond usability. The emotions felt when using pleasurable/displeasurable products are potentially more wide ranging than just satisfaction/dissatisfaction, and the properties of a product which influence how pleasurable/displeasurable it will be to use do not only include the property of usability. In order to fully represent the user in the product creation process, the human factors specialist should look both at and

beyond usability in order to create products that are a positive pleasure to use.

This might mean a wider role for the human factors specialist in product creation than simply being involved in the design of products, e.g. working with marketing and those involved with the technical aspects of products. It may also mean that human factors specialists will have to evaluate a wider range of issues than they have traditionally.

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