

CHAPTER TWENTY-FIVE

Comfort and Pleasure

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ABSTRACT

The ambition of this paper is to position the concepts of comfort, pleasure and usability in relation to each other, using as a basis the theoretical framework on pleasure with product use. The theme for this chapter is the relationship between comfort and pleasure in product use. The starting point considered is that pleasure with products goes beyond usability. In this context, comfort can be considered as an aspect of both usability and pleasure. The distinction between comfort and pleasure, what differentiates them and also how and where these two concepts intersect, is one focus. The empirical background for this study comes mainly from the context of car seat comfort, where the authors have performed two experimental studies. A wider interpretation of the concept of comfort is also brought into the discussion, based on a study of office seating and work on human comfort. Furthermore, a small questionnaire study about pleasure and comfort related to cars and car seats was conducted. This provided data to illustrate the relationship of comfort with pleasure in the context of the evaluation of the design of automobiles and their seats. The studies performed allow us to suggest hypotheses about the interrelation between comfort, pleasure and usability. Implications for industry include the findings that interpretations of these concepts are overlapping and would benefit from more distinct understanding. Practitioners are working with and need these concepts in order to create good, worthwhile and successful products. A final section argues the role of human factors in product development, considering comfort and pleasure in the light of environmental sustainability.

25.1 INTRODUCTION

Comfort and pleasure are both concepts that are receiving growing attention as a possible means of adding value to products. Sawaki and Price (1991) reported on the Human Technology Project in Japan, showing that factors such as comfort, enjoyment (a synonym for pleasure) and usability have increased in relative importance as part of

product quality. Usability-comfort enjoyment constitutes a new paradigm in the goal of product development, adding to the functionality-reliability-cost paradigm.

In historical terms, ergonomics' role in product development has shifted and widened over the last half of the 20th century. The history of human factors and ergonomics (Meister 1999) shows that in its early stages ergonomic intervention was meant to assure safety, health and performance for the users of products (e.g. the design of World War II aircraft cockpits, radar systems, etc.). This was followed by a stage where functionality was a goal of ergonomic studies in product development, initially through enabling increased performance and later by enhancing the usability of products. Comfort came as the next stage, although in some domains it might be regarded as an aspect of usability (e.g. software development). However, comfort may also be seen as an independent goal in itself, as is the case in car seat development. Finally, the emergence of pleasure as a goal in ergonomic product development completes the progression so far.

The boundaries between the different goals for human factors interventions are not clearly established, and a single intervention may of course accommodate several of these goals. Moreover, these boundaries may be subjective, or domain specific, creating variants of the distinction between these goals and concepts. As an example of this, usability may in some cases be seen as an aspect separate from performance. For other domains, usability may instead be seen as an aspect of performance.

25.2 AIMS, RATIONALE AND METHOD OF APPROACH

'This study aims at positioning the concepts of comfort, pleasure and usability in relation to each other, using as a basis the theoretical framework on pleasure with product use' (Tiger 1992; Jordan 1997).

The study also aims at positioning comfort in the hierarchy of user needs (Jordan 1997), which relates functionality with usability and pleasure (Figure 25.1).

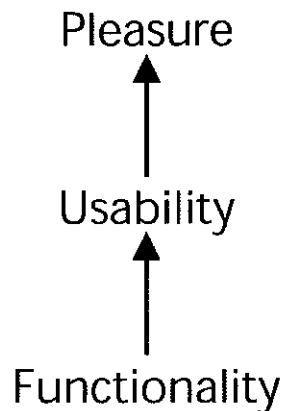


Figure 25.1 Hierarchy of user needs (fr. Jordan 1997)

A revision is proposed to this hierarchy, under the light of environmental sustainability. This aspect should not be forgotten in a review of the present role of human factors in product development, given the urgency of placing environmental concerns among the highest corporate priorities (ISO/DIS 14004). The focus of this study is on the distinction between comfort and pleasure and their intersection.

This being a first venture into a new area, it is our ambition to generate hypotheses

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about the interrelations of comfort, pleasure and usability, and later to test the hypotheses suggested with empirical data in studies to come.

This analysis is based on referenced definitions of comfort and pleasure. The case of pleasure and comfort in car use and car seats illustrates the relationships between these concepts, backed up by the results of a questionnaire.

25.3 LINKS BETWEEN COMFORT AND PLEASURE

Comfort and pleasure are linked and intersect each other as concepts, as can be extrapolated from the views and definitions presented below. Slater (1985) defined comfort as 'a pleasant state of physiological, psychological and physical harmony between a human being and the environment'. From an evolutionary point-of-view, comfort and pleasure, as well as pain and discomfort, have been receiving great attention by human beings since the birth of the species. Tiger (1992) defends this idea with the following argumentation: 'Our ancestors found comforting pleasure in nothing more complex than sitting by a fire and watching its ever varied motion. (...) our pleasures are as much related to our history as a species and products of it as they are products of our invention. (...) Ancient parts of the brain constantly monitor the comfort of the body and obviously seek to reject pain and seek pleasure'. It comes as no surprise, therefore, that contemporary human factors approaches to product development are giving greater emphasis to comfort and pleasure, adding up to previously established goals, i.e. safety and health, performance and usability.

Tiger (1992) distinguishes among four categories of pleasure: physiological, psychological, sociological and ideological pleasures. Jordan (1997) reinstated these and illustrated them with case studies of product use, defining pleasure with products as the 'emotional, hedonic and practical benefits of product use'. In a similar manner, comfort can be considered to have three different categories: physiological, physical and psychological (Slater 1985). While physiological pleasure is clearly linked to physiological and physical comfort, psychological comfort may be linked to psychological pleasure. However, sociological and ideological pleasures cannot be directly linked to comfort, except in the case where comfort is considered as an aspect of the quality of life (Maldonado 1991).

Zhang, Helander and Drury (1996) identified factors of comfort and discomfort in office sitting. The following descriptors of sitting comfort were brought forward in the study, based on a survey of 42 office workers:

agreeable,	at ease,	calm,	content,
cozy,	happy,	luxurious,	not think about workplace,
pleasant,	pleased,	plush,	refreshed,
relaxed,	relief,	restful,	safe,
softer,	spacious,	supported,	warm and well-being.

These descriptors of comfort reinforce the idea that comfort and pleasure are intersecting concepts. The hedonic benefit from comfortable sitting is conveyed by 'well-being, safe, pleased, pleasant, content'. Physiological pleasure can be linked to the descriptors that are related to physiological or physical comfort, such as 'cozy, plush, refreshed, relaxed, relief, softer, spacious, supported, warm'. Psychological comfort may be reflected in the terms 'agreeable, at ease, calm, happy, not think about workplace, restful'. Sociological and ideological pleasure are the most unlikely to be linked to the above descriptors, although the term "luxurious" might be thought of in such a context.

Table 25.1 Links between comfort and pleasure found from the definitions of Slater (1985), Tiger (1992), Jordan (1997) and from the study of Zhang, Helander and Drury (1996)

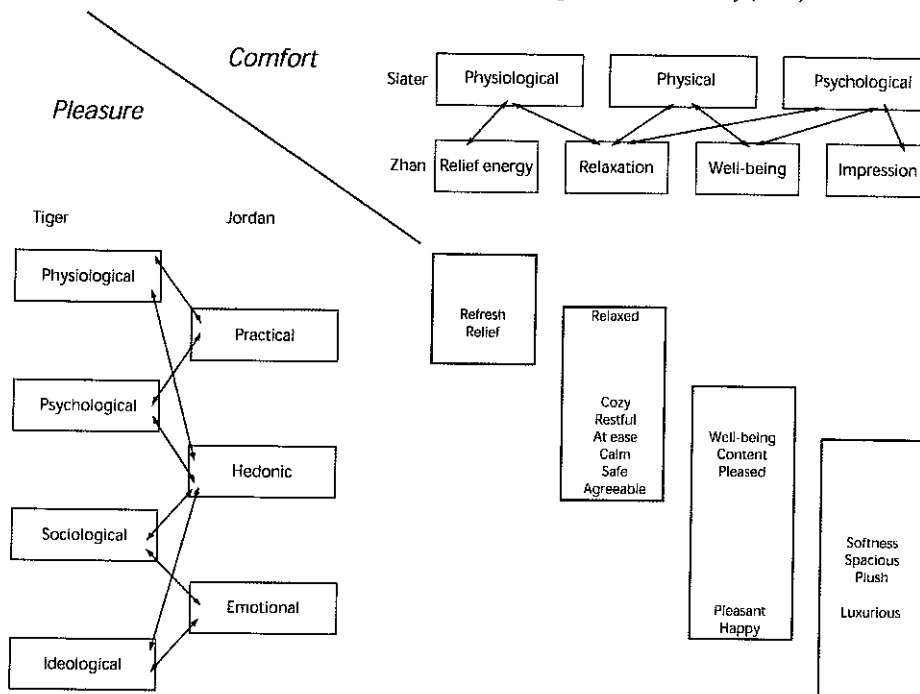


Table 25.1 describes a subjective interpretation of the authors, trying to bring together models of pleasure (Tiger 1992; Jordan 1997) and relating them to models of comfort (Slater 1985; Zhang, Helander and Drury 1996). Tiger and Jordan suggest ways of breaking down 'pleasure' into separate dimensions. Similarly, so do Slater and Zhang with 'comfort'. In Table 25.1, we have interpreted the definitions of the dimensions and tried to relate them within comfort and pleasure respectively, but also between comfort and pleasure. A frame indicates a suggested relation. The comfort descriptors described by Zhang have then been positioned in the comfort dimensions according to the results of Zhang, and by us subjectively in the pleasure dimensions. This exercise suggests that the descriptors of comfort derived by Zhang, Helander and Drury (1996) all seem to be relevant from a pleasure point-of-view. We further suggest that comfort is a constituting part of pleasure and it seems that pleasure holds dimensions not included in comfort: performance pleasures, skill pleasures, aesthetical pleasures, etc. The exercise also triggers the idea of performing an analogy to the Zhang study, but focused on pleasure, to more stringently grasp the dimensions of pleasure.

The exercise suggests that the boundaries between comfort and pleasure in product use are blurred and would benefit from more strict consideration in the light of a spectrum of empirical cases. Table 25.1 summarises the links found between comfort and pleasure. One may as well consider a similar exercise relating discomfort and displeasure in sitting, which is the discussion presented in the following paragraph.

We believe it is not a straightforward cause-effect relationship that discomfort in sitting leads to displeasure. An uncomfortable seat may not allow a pleasurable sitting experience, since sitting in that seat is an unpleasant experience, but the seat might be pleasurable in other aspects. The seat may have a nice looking design or a soft touch that

would enable physiological and pleasure components, although pleasure is a negative emotion during the sitting experience.

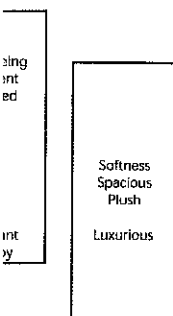
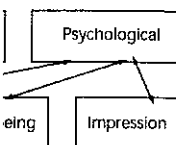
One can imagine a pleasurable sitting experience as comfortable or uncomfortable by Zhang, Helander and Drury (1996). Interrelated variables of pleasure are, for example, ways, as with different seat aesthetics, and different pleasure categories, its four categories.

25.4 INTEGRATING COMFORT AND PLEASURE

This section applies the concepts of comfort and pleasure to car seats. The argument is based on the functionality and supporting the case of car seats.

The comfort of a car seat, in terms, for a car seat, adjustment features, distance from the driver, also to support the driver, adjust the seat, having easily a seat, Being easy to get in and out of (egress/ingress), Focusing the attention on the functionality of the car, driving. Reynolds (1996) driver. Therefore, a car seat means it is a car seat. Ultimately, a car seat while performing its function, driver's seat is a car seat, is linked to the car, available, has a car seat.

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would enable other pleasures (sociological), but not physiological pleasure, since physiological or physical comfort are absent. A distinction between pleasurable products and pleasure derived from activities can be made in this example. The seat (product), although pleasurable to look at and to touch, does not enable pleasurable sitting (activity). A negative emotional response to the physiological or physical discomfort occurring during the sitting activity may be present as physiological displeasure.

One can analyse displeasurable sitting and relate it to sitting discomfort, but can pleasurable sitting be related to sitting comfort? To distinguish between seats that are comfortable one must look at the pleasurable aspects of each seat. This idea is supported by Zhang, Helander and Drury (1996) who suggest that comfort-discomfort are two interrelated variables, although not a continuum. This has a bearing on the hypothesis that pleasure is something more than comfort. Seats can be comfortable in many different ways, as with different assumed postures, or with different seat cushion stiffness, or different seat fabric properties, or different seat contours, or different seat styling, aesthetics, and so on. Different seats (although comfortable) will enable distinctly different pleasurable sitting experiences, since pleasure can take the form of any or all of its four categories: physiological, sociological, psychological, and ideological.

25.4 INTEGRATING FUNCTIONALITY, USABILITY, COMFORT AND PLEASURE - THE CASE OF CAR SEATS

This section applies Jordan's (1997) hierarchy of user needs to an example of a product, i.e. car seats. Car seats are commonly evaluated in terms of comfort. In this section the argument is brought forward claiming that car seat comfort is built upon basic seat functionality and usability of the seat and its controls. The section presents arguments supporting the intersection of comfort with functionality, usability and pleasure in the case of car seats.

The comfort of a car seat depends on the characteristics of the seat and, in general terms, for a car seat to be comfortable it must provide functionality. This can be seen as adjustment features, such as height of the seat, reclining the backrest, adjusting the distance from the pedals, and so on. However, the inherent functionality of a car seat is also to support the occupant at ease in a driving posture. One can judge if it is easy to adjust the seat settings, and this would be part of evaluating the usability of the seat. But having easily adjustable settings is not the only way in which the seat can be easy to use. Being easy to use (e.g. its usability) also means it is easy to get in and out of the seat (egress/ingress characteristics), and that it is easy to use the seat in all that it is used for. Focusing the attention on the driver seat of the car, as there are more demands on its functionality than in the other seats in the car, the seat is used primarily for sitting while driving. Reynolds (1993) considers the car seat as an interface between the car and the driver. Therefore, besides the usability of the seat adjustments, being easy to use (the seat) means it is easy to drive, to see the road and to reach the controls while sitting in that seat. Ultimately, usability of the seat means it is easy to sit in or to stay seated in the seat while performing the task of driving. In other words, part of the usability of the driver's seat is that it is comfortable. We have also seen how the functionality of the seat is linked to comfort, since basic functionality, such as the adjustment possibilities available, has an impact on comfort in the seat.

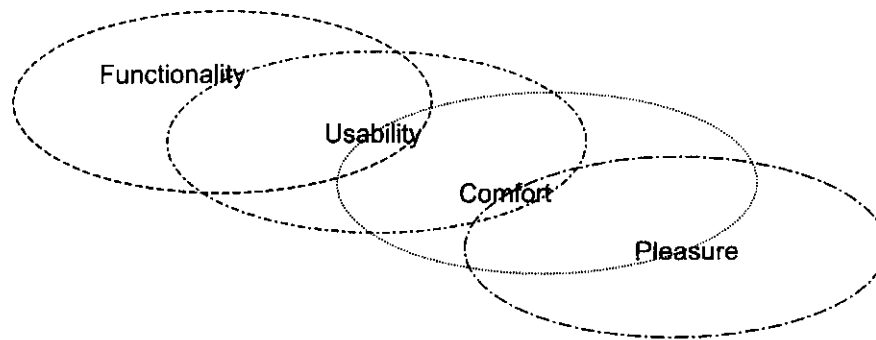


Figure 25.2 The blurred boundaries and intersections of functionality, usability, comfort and pleasure - the case of the driver's car seat

In the previous section, a study of comfort in office seating (Zhang, Helander and Drury 1996) led us to suggest that comfort could be seen as an aspect of pleasure. This analysis of the usability of the driver's car seat suggests that comfort may also be seen as an aspect of usability, defined as the effectiveness, efficiency and satisfaction with which users can achieve tasks with a product (ISO DIS 9241-11). Assuming that Zhang, Helander and Drury's (1996) descriptors of comfort can be applied to the driver's car seat, one concludes that functionality, usability, comfort and pleasure in the seat are concepts that intersect each other, and do not have strict boundaries (as shown in Figure 25.2). Furthermore, the element of satisfaction in the definition of usability may be linked to pleasure.

25.5 EMPIRICAL OBSERVATIONS

Comfort and pleasure have been discussed and links have been emphasised between these two concepts in the preceding sections, crossing the boundaries of functionality, usability, comfort and pleasure. A structured questionnaire was designed to test the applicability of Tiger's (1992) 'Four pleasure' classification and Jordan's (1997) 'Hierarchy of user needs' for driving, cars and car seats. The results of the questionnaire reveal evidence to support the links exposed between comfort and pleasure and the inter-relationships in the levels of user needs. The methods used and the results of the questionnaire are presented in the following paragraphs.

Thirteen Swedish automobile drivers answered the structured questionnaire, which had both open-ended and multiple-choice questions. The subjects were seven men and six women, aged from 30 to 65 years old, who had driven regularly for at least five years, driving between 5 and 20 thousand kilometers per year. The questionnaire administration was integrated with a larger research study on car seat comfort (Coelho and Dahlman 1999). A further selection criterion of the subjects was their sitting height. There were four subjects in each of the following sitting height intervals: 82-84cm and 92-94cm. There were five subjects in the 87-89cm sitting height interval. Each subject responded to the questionnaire during his or her leisure time, after performing two two-hour-long sitting trials in the laboratory, separated by approximately a week. A telephone number was indicated in the questionnaire header for support, however, none of the subjects called to clarify questions in the questionnaire.

Selected results of the questionnaire are presented in the following paragraphs. The question 'Do you find driving pleasurable?' yielded the following results:

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'Not at all'	8%
'Somewhat'	46%
'Rather a lot'	38%
'A lot'	8%

These results show that the vast majority of the subjects considered driving as a pleasurable activity. This does not directly imply that the product that supports the activity (the car, the seat) is pleasurable. A suggested hypothesis (see above) is that the pleasure derived from the interaction with a product can either originate in the activity, or from the product qualities. In the case of car driving a combination of both seems to apply, as can be seen from the results of this question and those following.

To the question 'Do you think driving is hard?' subjects answered:

54%	'Never'
31%	'In adverse conditions'
15%	'Driving is hard in adverse conditions, but it is pleasurable to succeed in doing it'

The 15% of the total of 13 subjects who gave the last answer seem to derive a sort of psychological pleasure from completing a hard driving task in adverse conditions. This may lead one to suggest the hypothesis that pleasure with an activity may exist even though psychological discomfort is present.

The 13 subjects participating in the study were probed about the pleurability of the interiors of their cars. This yielded the following results:

54%	considered that the interior of their car was 'somewhat pleasurable'
23%	thought it was 'pleasurable'
23%	thought that it was 'not pleasurable at all'
0%	considered it to be 'very pleasurable'

Although the subjects had cars of different makes, size and age, these answers show that pleasure seems to be a relevant attribute for the design of car interiors.

When asked to describe pleasurable attributes of their car, the subjects mentioned (number of subjects mentioning the attribute is indicated in parentheses):

- comfortable (5)
- performance (3)
- lovely road handling (2)
- nice looking design (2)
- safety (2)
- automatic transmission (1)
- gives me freedom (1)
- strong construction (1)
- well built (1)
- well equipped (1)
- quick (1)
- sportiness (1)
- big car (1)
- comfortable seats (1)
- good seats (1)
- cozy (1)

This question had open-ended possibilities for the subjects' answers, which might explain the spread in the results. Still, the answers show that 5 of the 13 subjects answering the questionnaire considered that their car was comfortable and that this contributed to make it pleasurable. This result supports formulating the hypothesis that comfort enables pleasure. It also shows that people understand the separation between a pleasurable activity (driving or socialising in the car) and pleasurable attributes.

Subjects were asked if it was a pleasurable experience to socialise with others in their car, yielding the following results:

54%	'Yes, always'
38%	'Yes, on relaxed occasions'
8%	'No, never'

These results show that, for the vast majority of the subjects, pleasure can be derived from the company of others in the car, thus falling into the category of sociological pleasure.

The subjects were also requested to indicate the persons whose company they appreciated in the car, with the following answers:

77%	enjoyed the company of their spouses while driving
69%	enjoyed the company of their children while driving
62%	enjoyed having their friends while driving
31%	enjoyed having their colleagues while driving

(Not all of the 13 subjects were married or had children living with them and there were two retired persons in the group.) By enabling the presence of others in the car (a functionality attribute) sociological pleasure can be derived from using the vehicle (product). This is an example of how pleasurable interaction may be built directly on basic functionality.

The subjects were asked if their car reflected their ideological values, yielding the results presented below:

38%	Thought that their car did 'not' reflect their ideological values
23%	Answered that their car did 'somewhat' reflect their ideological values
38%	Replied that their car reflected their ideological values 'rather a lot'
0%	Answered that their car reflected their ideological values 'a lot'

One of the subjects who answered that her car reflected her ideological values rather a lot added a comment to the answer, saying that her car was meant to carry her and her spouse and their things and food, in an economic, quick, comfortable and safe manner. The wording of the question and its results support suggesting that identification with the product derives from a match between users' requirements on the product and its affordances.

The subjects were asked to rank seven attributes of car seats in order of importance to them. The results are shown below (most important - top of the list):

- The seat is comfortable.
- The seat has the right adjustment possibilities.
- The seat cover has a soft touch.
- The seat looks good.

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- The seat cover is beautiful.
- The seat cover does not need to be washed.
- I look good when I sit in the seat.

The combined answers of the 13 subjects have a Kendall coefficient of concordance of 0.83, significant for $p < 0.001$. Comfort of the seat ranks highest in the list, followed by the adjustments available (which can be considered an aspect of functionality or usability of the seat). Physiological (tactile) pleasure as well as physiological comfort may be derived from the soft touch of the seat cover, which comes next. The aesthetic qualities of the seat rank in fourth and fifth place, these are necessarily pleasure-linked attributes that may lead to sociological pleasure once others recognise the beauty of the seat. Attribute six may be connected to functionality and usability of the seat. Finally, the lowest ranking attribute may also be considered an aesthetic quality, leading to sociological pleasure.

The results of the questionnaire show the relevance of the 'four pleasure' framework to the specific products considered (cars and car seats). Furthermore, subjects' answers show that pleasure can be derived from the activity of driving and the products that support it. Comfort is seen as one of many possible attributes that contribute to a pleasurable car. Functionality and usability attributes are also present in the results of the questionnaire. These results, and the conclusions of the first part of this section, support revising the model of the hierarchy of user needs (Jordan 1997) to encompass the aspect of comfort. Figure 25.3 depicts the suggested adaptations to the model.

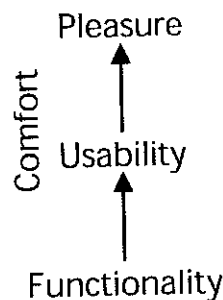


Figure 25.3 Hierarchy of user needs, adapted from Jordan (1997) to encompass the Human Factor goal of comfort, in its relationship with pleasure, usability and functionality (based on the analysis of the case of car seats)

25.6 SUSTAINABILITY AND USERS' NEEDS

The goal of human factors intervention and its role in product development is considered to be supporting the development of products, which are functional, user-friendly and pleasurable (Jordan 1997). Although for many products there is still a long path ahead towards achieving pleasurable interaction, a reflection and argumentation can be made concerning the importance of the users and developers' role also in attaining environmental sustainability. Environmental planning is encouraged throughout the product life cycle (ISO 14004), and it is generally accepted that moderate and wise use of the planet's resources is a pre-condition to assure a sustainable environment. As well as the need to give users functional, user-friendly, and pleasurable products, products might also have an embedded appeal which would encourage suitable and sustainable use and promote discarding in an environmentally friendly way, e.g. recycling.

Above the pleasurable level in Jordan's (1997) model of user needs (shown in Figure 25.1) one should consider the ceiling of sustainability which helps to set designers

and users on the right track. That means putting users of products in a perspective that stresses global awareness and what their role is in preserving the environment and assuring a sustainable life style for the coming generations.

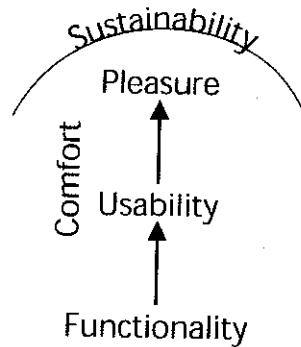


Figure 25.4 Model of the hierarchy of user needs, adapted from Jordan (1997), considering comfort and limited by sustainability

The role of human factor specialists in this enterprise is to assure that the emotional responses users attain through interacting with products are ones that will be good for us as individuals, for society, for humanity, and for the planet. The immediate benefit is environmental sustainability. Jordan's (1997) model can thus be further adapted to encompass this sustainability ceiling in the hierarchy of user needs, as shown in Figure 25.4. Further studies are needed to understand and explore the impact of this limitation on product development and users' interaction with products.

25.7 CONCLUSION

The exercise of linking comfort and pleasure suggests that comfort fits nicely into being an aspect of pleasure, and that the boundaries between comfort and pleasure in product use are overlapping and specific to the context and situation. It seems that pleasure holds dimensions not included in comfort: performance pleasures, skill pleasures, aesthetic pleasures, to mention a few. The ambition to clarify and define the overlapping and intersection of these two concepts should be pursued as a more strict consideration in the light of a spectrum of empirical cases. Table 25.1 summarises the links suggested between comfort and pleasure, while Figure 25.2 gives a graphical interpretation of the overlapping boundaries of these concepts and functionality and usability.

Taking as a basis Zhang, Helander and Drury's (1996) suggestion that comfort-discomfort are two interrelated variables, although not a continuum, the authors suggest that different seats (although comfortable) may enable distinctly different pleasurable sitting experiences, since pleasurable can take the form of any or all of the categories considered by Tiger (1992): physiological, psychological, sociological and ideological. In this context one could consider the relation between discomfort and displeasure in sitting, since a seat that is pleasurable to look at and to touch may not enable pleasurable sitting.

This study also suggests that part of the usability of the car driver's seat is that it is comfortable. In the same line of thought, seat functionality can be linked to comfort, since basic functionality has an impact on comfort in the seat. Furthermore, basic functionality of the automobile (accommodating other occupants besides the driver) is a pre-condition for sociological pleasure, derived from the company of others in the car.

A suggested hypothesis resulting from the analyses presented here is that pleasure

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may either derive from the interaction with a product (given the product's qualities), or it may originate in the activity supported by the product. Other hypotheses were formulated, based on empirical data and the analyses conducted. These included the hypothesis that identification with the product derives from a match between users' requirements and ideological values and the product's affordances.

Finally, this contribution revises Jordan's (1997) hierarchy of user needs, considering the addition of comfort and in the light of environmental sustainability. The result is shown in Figure 25.4. Further studies are needed in order to understand and explore the impact of the limitation of sustainability on the development of pleasurable products and on users' interaction with products.

Implications of the study for industry include the findings that the boundaries between functionality, usability, comfort and pleasure may be indistinct for most products. This urges practitioners to look both at and beyond each of these concepts in order to create good, worthwhile and successful products.

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25.8 ACKNOWLEDGEMENTS

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- Coelho, D.A. and Dahlman, S., 1999. Articulation at Shoulder Level - A Way to Improve Car Seat Comfort? Technical report - University of Beira Interior, Covilhã, Portugal and Chalmers University of Technology, Göteborg, Sweden, 159 pp.
- ISO/DIS 14004, 1995. Environmental Management Systems - General Guidelines on Principles, Systems and Supporting Techniques.
- ISO/DIS 9241-11, Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) - Part 11: *Guidance on Usability*.
- Jordan, P.W., 1997. A Vision for the Future of Human Factors. In *Proceedings of the HFES Europe Chapter Annual Meeting 1996*. Brookhuis K. et al. (Eds), (University of Groningen Centre for Environmental and Traffic Psychology), The Netherlands, pp.179-194.
- Maldonado, T., 1991. The Idea of Comfort. In *Design Issues*, 8, 1, pp. 35-43.
- Meister, D., 1999. "The History of Human Factors and Ergonomics", Lawrence Erlbaum Associates, Mahwah, New Jersey, USA, 382 pp.
- Reynolds, H.M., 1993. Automotive Seat Design for Seating Comfort. In *Automotive Ergonomics*. Peacock, B. and Karkowski, W. (Eds), Taylor & Francis, London, UK.
- Sawaki, Y. and Price, H., 1991. The Human Technology Project in Japan. In *Proceedings of the Human Factors Society 35th Annual Meeting - 1991*, Santa Monica, California, USA, pp. 1194-1198.
- Slater, K., 1985. *Human Comfort*. Springfield - Illinois: Thomas Books, USA, pp. 3-11.
- Tiger, L., 1992. *The Pursuit of Pleasure*. Little Brown and Company, Boston, USA, pp. 52-60.
- Zhang, L., Helander, M.G. and Drury, C.G., 1996. Identifying Factors of Comfort and Discomfort in Sitting. In *Human Factors*, 38, 3, pp. 377-389.