Psychological Implications of Personalised User Interfaces

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Abstract

A series of quantitative and qualitative investigations were performed in the course of the PhD to assess the psychological impact of the use of personalised user interfaces. The research involved three parts: (1) controlled web-based experiments investigating the interaction of personalisation and personification, i.e., the degree to which the interface presents itself as a human being; (2) qualitative studies assessing personalisation of appearance and personalised recommendations; (3) further quantitative studies investigating the findings from Part 2.

Part 1 involved two experiments where the participants were asked to interact with a fictional online bank incorporating personalisation and personification. The experiments led to the conclusion that under some circumstances, the incorporation of personalisation features in a web-based electronic service can have beneficial user effects. It may be that in certain circumstances personalisation should be accompanied by personification to enable these effects. The qualities on which personalisation and personification may have a positive impact include at least mental workload, engagement, trust, and emotional involvement.

Rather than focusing on the combined effects of a range of personalisation features, Part 2 studied individual personalisation features. Discussion groups were run to investigate the user implications of personalisation of appearance and personalised recommendations. Grounded theory analysis of the transcripts yielded theories on these two technologies. In the former theory, Dispositions lead to Personalisation Behaviour, which in turn has Effects on the user. The latter highlights factors that affect an individual's disposition to use personalised information. The Theory of Personalisation of Appearance (TPA) was further developed and validated using two qualitative follow-up studies.

In Part 3, a questionnaire and an experiment were performed to validate the structure of the TPA. In the questionnaire study, consistent with the TPA, the main elements of the TPA correlated positively with each other. The study also resulted in modifying the super-categories grouping the Effects. The experiment, although exploratory, found support for the notion that Personalisation Behaviour causes Effects. Both of the validation studies suggested that the TPA provides an accurate description of the phenomenon it aims to describe.

Table of Contents

Tables

Figures

Preface

This PhD is concerned with the user implications of personalised interfaces; it takes the perspective of Human Computer Interaction (HCI). The thesis consists of three parts. Part 1 introduces the concept of personalisation and studies the interaction between personalisation and personification using an experimental, web-based paradigm. Part 2 investigates the user implications of personalised recommendations and personalisation of appearance, through qualitative methods. In Part 3 the Theory of Personalisation of Appearance is validated with the help of a questionnaire-study and a controlled experiment and conclusions are drawn regarding the thesis.

This work took place between 1999 and 2002 in the Department of Psychology at the University of York. Professor Andrew Monk supervised the thesis. The research was supported by NCR, UK.

J.O.B.

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Author's declaration

Prior to submitting the PhD thesis, four papers were published or were in press that were concerned with the material presented in the thesis. Blom (2000) provided a definition and taxonomy of personalisation. These are discussed in Chapter 1 of the thesis. Blom & Monk (2001) presented the findings of Experiment 1 (Chapter 2), and Blom (2002) was concerned with the Theory of Personalised Recommendations (Chapter 4). Blom & Monk (in press) described the Theory of Personalisation of Appearance. This paper included material presented in Chapters 5 – 7. Although two of these papers were jointly written, I declare that all the material presented in this thesis is based on my own work.

Part 1

The thesis consists of three parts. Part I, in addition to introducing the existing research that has been conducted on personalisation, also investigates the interaction between personalisation and personification using a quantitative research paradigm. Part 1 includes three chapters. Chapter 1 provides an introduction to the thesis research and Chapters 2 and 3 describe Experiments 1 and 2.

Chapter 1. Introduction

1.1 Personalisation: Three perspectives

I started writing this thesis with the latest version of Microsoft Word. As the hours I spend working with this application increase, I notice that Word automatically hides the access to many of the functions I rarely use. A similar kind of sensitivity can be observed on many web sites. For instance, Yahoo! displays my local weather information. When I click on a link on Amazon.com to find information on a book I'm interested in, a long list of books appears on the bottom of the page. These are recommended to me on the basis of their similarity to the original item of interest. In all of these examples, the system adapts itself to accommodate my needs and interests, a phenomenon better known as personalisation. In addition to the adaptive changes discussed above, personalisation also refers to user-initiated changes. Selecting a new colour cover to a mobile phone or changing the wallpaper of the desktop of one's computer are examples of such adaptable aspects of personalisation.

Personalisation has increased in importance in conjunction with the 'third stage of web evolution', where the contents of the web pages are dynamically created (Luedi, 1997)[1], and may change as a function of user characteristics. Many authors (cf., Berghel, 1995; Hysell, 1998; Luedi, 1997; Manber et al., 2000) highlight the importance of the use of these technologies. Personalisation, it is believed, has the potential to increase the loyalty and satisfaction of online customers. There has also been an increase in the adoption of user-initiated personalisation technologies. Each edition of Microsoft Windows has introduced new decorative features for personalising the desktop (Blom & Monk, in press), and word processors allow the user to change the menus and tool bars (Blom, 2000).

Current academic interest towards personalisation focuses either on classifying various personalisation methods (cf., Kobsa, Koenemann, & Pohl, 1999) or on describing the

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1 The first stage of the web evolution, according to Luedi, implied the use of static, preconstructed web sites. The second stage followed when it was possible to create dynamic web sites, wherein pages were constructed on fly. However, dynamic web sites still present the same content to everyone, which is not necessarily the case in the third stage of the evolution, in which the content may be adapted at the level of an individual.

underlying marketing principles (Peppers & Rogers, 1997). The former could be described as a system-centred approach, and the latter as a business-oriented perspective (Blom, 2002). Not much is known, however, about the user's perspective. That is, what are the user implications of interacting with personalised user interfaces? Due to the increasing trend in the use of personalisation technologies, lack of understanding of the user's perspective is a weakness. This thesis was undertaken with the specific aim of establishing a body of knowledge on the psychological implications of personalised user interfaces. The advantages of this approach are clear: in addition to the academic knowledge created, understanding the user implications of personalised user interfaces can also benefit the design of personalisation technologies making these features more valuable to users.

This chapter starts with a definition of personalisation in Section 1.2. An overview of the research that has been conducted on personalisation will be described in Sections 1.3 – 1.5. Here personalisation literature will be discussed from system-centred, business-centred and user-centred perspectives, respectively.

1.2 Defining personalisation

It is assumed that personalisation requires a system and a user. It is a *process* involving changes that are made to the system. The changes make the system more suitable to the needs, intentions or desires of the user. Thus personalisation is assumed to result in the system becoming *personally relevant* to the particular user. Personal relevance could be suggested to be one of the key issues in personalisation and this notion is also present in the definitions of personalisation by Kamba et al. (1997) and Luedi (1997). The term 'personalisation' implies that the process is unsuccessful unless the changes manage to render the system more consistent with the needs of the user, thus making it personally relevant. Personalisation is here also taken to refer to changes that persist across sessions (Mackay, 1991). If this were not so, almost anything we do when using a computer, e.g., entering data, could also be regarded as personalisation (Blom, 2000).

1.2.1 Dimensionality of initiation

In line with Oppermann & Simm (1994, p.14), it is assumed that in personalisation the change can be initiated by either the user or the system:

> "Flexibility may come in the form of options for individualization [personalisation] by preparatory activities. Such options may, in their turn, be implemented in two ways: in the form of active system changes made by the user (adaptability) or in the form of system changes made by the system (auto-adaptivity)."

Instead of viewing these two aspects as a dichotomy, we should rather regard them as a dimension because often both the system and the user participate in the process (Blom, 2000). For instance, the system may recognise that some aspects of the user's interaction with the software could be optimised, but the change does not take place until the user has authorised it. To emphasise the idea of dimensionality, the current study will use the terms 'system-initiated personalisation' and 'user-initiated personalisation' to refer to adaptability and adaptivity, respectively.

Kobsa (1999, p. 8) provides three insightful examples to illustrate the dimensional nature of personalisation. As an instance of user-initiated personalisation Kobsa refers to the following situation: a user of a web site may wish to introduce a shortcut to a web page that is frequently visited but deeply buried in the site hierarchy. The user then proposes to herself to introduce a new link on the lateral navigation bar of the site pages or to define a bookmark in the browser, selects the shortcut link, and performs necessary steps to produce this adaptation. In contrast, argues Kobsa, the system AVANTI (Fink et al., 1998) automatically inserts such personalised shortcut links for pages that a user frequently visits. Intermediate forms of personalisation are also possible, such as the user requesting the introduction of shortcut links and letting the system decide which are best.

Kobsa (1999) introduces the terms adaptation *initiator*, adaptation *proposer*, adaptation *selector*, and adaptation *producer* to account for the steps required in the personalisation process. These terms characterise personalisation well but are nevertheless not adopted for the working definition of this process. The purpose of this research is to investigate the

psychological aspects of personalisation and it is not therefore necessary to take the granularity to a deeper level than the above-proposed system-user initiation dimension.

1.2.2 Objects of change

Oppermann & Simm (1994) suggest that the two areas of personalisation include changes made to the *functionality* and *interface* of the system. An example of the former is the assignment of special characters on any given keys on the computer keyboard. Personalisation of the interface, on the other hand, takes place when Word hides the access to rarely used functionality. Functionality and interface are not, however, the only areas in the HCI context that can be personalised –changes made to the *information content* are also an integral part of this process. Personalisation of the information content of a system could imply customisation of a digital newspaper so that only articles that the user finds relevant are displayed. With the accumulating information on the Internet, techniques that filter out the irrelevant have also increased in importance. Recommender systems, services delivering personalised recommendations, provide an effective means of information filtering (Blom, 2002). Another aspect that is ignored by Oppermann & Simm is changing the *distinctiveness*, i.e., appearance, of the system. This could take place by changing the colour of the cover of a mobile phone or by adding one's picture to a personal web site. The table below lists the objects of change in the personalisation process. It also includes illustrations of the objects.

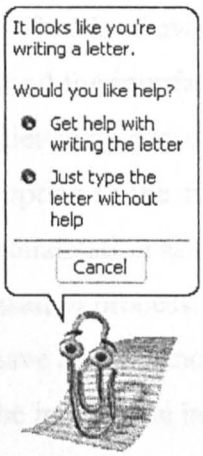
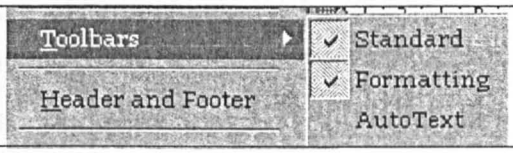
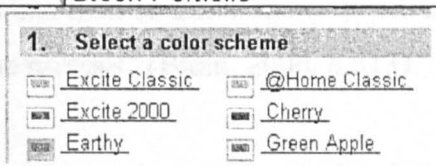
Object of change	Illustration
Functionality	Microsoft Office Agent providing context-sensitive help regarding the functionality of word processing 
Interface	Customisation of the toolbar in Word 
Information content	Selecting the news that are displayed on Excite.com 
Appearance	Selecting a colour scheme to Excite.com 

Table 1.1. Objects of change in personalisation include functionality, interface, information content and appearance.

It is easy to regard the anthropomorphisation of the interface as an instance of personalisation. The use of social agents on a web site is an aspect that is increasing in popularity and it is not unheard of to refer to this as personalisation. This could be because anthropomorphisation contributes to the personal nature of the service. When looking at the definitions of personalisation that have been discussed in the present section, however, the anthropomorphisation of the interface does not represent an instance of personalisation. The use of, say, a graphical human-like agent is not about changing the interface for a given individual. Rather, it is a way or channel of presenting the information. Consequently, these two concepts ought to be regarded as distinct processes.

The degree to which a system projects itself as being human is here referred to as personification. A study by Light & Wakeman (2001) taps this phenomenon. These

authors performed a qualitative study of users who entered text as part of their interaction with a web site. The process brought with it two levels of awareness: that of the interface, and that of the social context, or audience, beyond the interface. Making the service consistent with the user's awareness of the audience by personifying the interface might therefore play a role in shaping the user's perception of the system. Interestingly, personification may have implications for personalisation as well, as often the user is required to submit data as part of the personalisation process. Whether or not the interface is personified in this context might therefore have an influence on the experience of interacting with the personalisation feature. The interaction between personalisation and personification is an interesting issue providing a fertile ground for future studies.

To summarise the present section, the following definition of personalisation emerges:

> "Personalisation is defined here as a process that changes the functionality, interface, information content, or appearance of a system to increase its personal relevance to an individual. The effect of the changes should persist across sessions...Personalisation can be system or user-initiated...It is important to view this as a dimension rather than as a dichotomy as often both the system and the user participate in the process" (Blom, 2000, p.313).

A definition for the process of personalisation has now been adopted. The following sections provide an overview of the three different genres in personalisation literature: marketing, computer science and psychology.

1.3 Personalisation: marketing perspective

The marketing literature mainly views personalisation from the perspective of system-initiated changes taking place in the context of electronic commerce (eCommerce). Dynamic web pages make the content unique and tailored to the needs of each customer. Instead of utilising a 'one-to-all' paradigm of delivering information, marketers believe that personalised sites have the chance of creating more meaningful and longer lasting relationships with customers. It is believed that when receiving personalised information, the user is more likely to perceive the system as a physical form of business, whereby the customer interacts with a real person, and receives personalised service. The dynamic

content enables engaging dialogue to take place between the customer and the service provider and furthermore, merchants are also allowed to track and mine data on customer behaviour in order to predict needs better than with static web pages (Peppers & Rogers, 2000). It is therefore not surprising that the use of personalisation features has become a marketing paradigm in its own right.

Kobsa (1999) states that customers need to feel they have a unique personal relationship with the business. The terms personalisation, micro marketing and one-to-one marketing are often used to describe this business model, with Peppers & Rogers (1993, 1997) being the main advocates of this paradigm. One-to-one marketing falls under the umbrella of Customer Relationship Management (CRM), and the need for proper CRM can easily be quantified: Peppers & Rogers (2000) state that in the first half of the year 2000, individuals in the US spent $37 billion on retail through the Internet, with the corresponding figure for world-wide business-to-business eCommerce reaching as high a figure as $400 billion. With these sums at stake, Peppers & Rogers conclude that it is startling to see businesses losing 15% to 35% of their customers annually, usually due to poor sales service interactions. There is thus a chance to improve the customer loyalty by focusing on web-based CRM strategies, such as personalisation. Peppers & Rogers argue that customer satisfaction is a crucial factor. Shoppers with satisfying first-time experiences completed 12 transactions and spent over $500 in one year, compared to only four purchases and $140 among the dissatisfied ones. It should be noted that a certain criticality is needed here toward arguments of this sort. The marketing literature seems to equate the use of personalisation technologies with CRM. This seems to be an unnecessarily bold step to take, as there is not much knowledge about the actual effects of personalisation on subjective customer satisfaction. Most of the assumptions here are based on correlational research, which does not establish causal relationships between the factors that are studied.

To summarise the discussion relating to marketing aspects of personalisation, one-to-one marketing promotes an electronic communication paradigm that induces a perception in the user that she is receiving unique and personal service when she is in fact communicating with an electronic service. Personalisation is a major means for implementing this paradigm, as receiving tailored information is an integral aspect of natural interaction. In addition to personalisation, personification is also seen as a means to improve customer satisfaction and loyalty. Guttman et al. (1998) associate avatars or social agents with eCommerce and argue that using these semi-animated graphical

characters as sales agents can help build engaging, trusted relationships with customers. Parallels can thus be drawn here between personalisation and personification.

1.4 Personalisation: computer science perspective

This section provides a description of the various personalisation technologies that are currently used. This could be regarded as a computer science-driven way of categorising personalisation, as the main issues here are techniques that are used to achieve this process.

1.4.1 System-initiated personalisation

There is a great range of techniques used to achieve adaptive personalisation. Hirsh et al. (2000) argue that at one end, the system may do little more than recognise superficial patterns in a single user's interactions. At the other, the system may exploit deeper knowledge about the user, such as the tasks the user is performing, as well as information about what other users have previously done. What seems characteristic to many sites incorporating system-initiated personalisation is that there may be a range of personalisation techniques used on one single page. Some of these can be very simple, some more complex, and sometimes these techniques may be used in conjunction.

This section is concerned with illustrating the methods that are most often used in system-initiated personalisation. Kobsa's (1999) framework of 'acquisition data' will be described in further detail as it provides a useful way to approach this area.

1.4.1.1 Kobsa's acquisition data – framework for adaptive personalisation

According to Kobsa (1999), to be able to initiate or produce the personalisation process, the system has to either take into account the user's characteristics or base the changes on observing the user's actions. Environmental information can also be used, such as the type of software and hardware, or the usage locale, the user side is incorporating. Kobsa (1999) provides a detailed account of the above-mentioned data acquisition areas. He refers to

these as (a) *user data*: personal characteristics of the user; (b) *usage data*: user's interactive behaviour; (c) *environmental data*: the nature of the user's system. Figure 1.1 illustrates this framework.

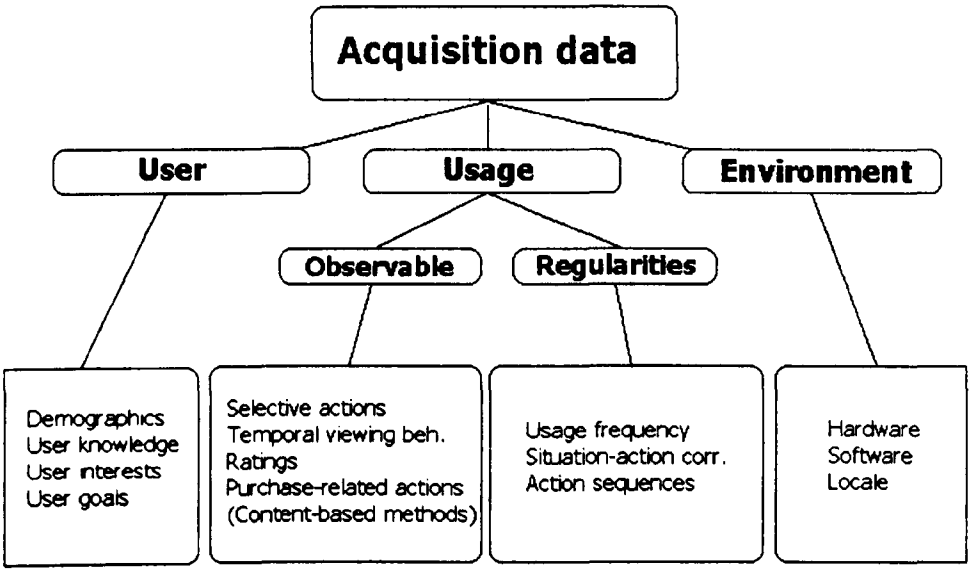


Figure 1.1. Kobsa's (1999) approach to describing the data that is used to achieve system-initiated personalisation.

When it comes to *user data,* personal characteristics of an individual, such as *demographic details, user knowledge, interests,* or *goals*, can provide the basis for personalisation. A common example of the use of demographic data is My Yahoo! search engine, which displays weather forecasts and sports news as a function of the post code of the customer (see Manber et al., 2000, for a detailed illustration on My Yahoo's personalisation features). User knowledge can also be used to ensure the information is presented at the right level of difficulty. Such is the case with intelligent tutoring systems (Kobsa, 1999).

User interests are relevant when it comes to recommender systems (RSs), systems that recommend items to users. A RS may be based on collaborative filtering, where the interests of the users are acquired implicitly by asking them to rate items with which they are already familiar (Guttman et al., 1998). The system then identifies a set of individuals whose profiles correlate to those of the user. The preferences of these like-minded consumers are used to produce the predictions. For instance, Moviecritic.com is an online service that requires users to rate films that they have seen. It then provides the user with

recommendations on previously unseen films. Finally, in Kobsa's (1999) model, the system can also take into account the goals or plans of the user.

In most cases, in order for the system to acquire user data, the user has to explicitly submit the data to the system. This requires a registration process. A principle of reciprocity is incorporated here: the enterprise acquires valuable information regarding the user which can be used for data mining purposes[1], and the user gets to use the service or buy the product she is after. The number of companies that use this method is vast. Table 1.2 illustrates this by providing examples from various sectors of eCommerce.

Area	Service/company	User incentive
Finance	Firstdirect.com, Ebank.com	Becoming a customer
News services	Financial Times web site (www.ft.com)	Added services, such as time management and e-mail account
Search engines / portals	Excite, Altavista, and Yahoo!	Chance to personalise the page
Entertainment	BoxMan.com	Buying products online
Car manufacturers	Audi, WV, Vauxhall	Receiving information through mail, entering competitions etc.
Travel	Ebookers.com	Becoming a customer

Table 1.2. Numerous companies require the user to submit demographic information in exchange for service or the chance to purchase online.

Usage data in Kobsa's (1999) framework refers to data that is acquired by the system observing the actions and behaviour of the user. This area consists of *observable usage* and *usage regularities*. The former refers to adaptations that take place directly after observing a given user action, whereas the latter is associated with making the changes once the long-term behavioural patterns of an individual have been recognised.

Direct adaptations can take place by observing *selective actions, temporal viewing behaviour, ratings,* and *purchase-related actions*. Selective actions may help determine the user's interests and preferences. A common instance of a selective action is clicking on a link. Provided there are many competing items to be selected on the page, the link the user eventually chooses to follow is often indicative of her interests or goals. Several rule-

[1] Data mining involves computer programs that infer relations among different kinds of data in large databases. The goal has been to infer useful relations that might not have been noticed or at least could not have been confirmed among these data (McCarthy, 2000). One could, for instance, discover certain purchase preferences or patterns among subgroups of consumers and then use this information for advertising.

based algorithms for personalisation can be identified here. A user may browse a site containing information about cars. The first time the user visits the site, the user might select a link to access the details of any particular car and then once on this drill-down page containing information about that specific car, she might choose a link containing the technical specifications of the car. At this point, an assumption can be made that this particular user in interested in the technical aspects of cars. When the user views another car, the system would then display the technical specifications automatically.

The assumption behind temporal viewing behaviour is that if a user spends a long time on a page, it serves as an indication of the fact that she is interested in its content. Kobsa (1999) also refers to ratings and purchase-related actions as triggers for personalisation. The former implies the utilisation of the user explicitly rating items, e.g. films, products, or music. When it comes to purchase-related actions, these are generally regarded as strong indicators of user interest, with Amazon.com being offering a well-known example of the use of this method.

Finally, when it comes to usage regularities, a typical user exhibits many patterns when interacting with a computer. Hirsh et al. (2000) state that machine-learning algorithms are being used to recognise such regularities and integrate them into the system to personalise the system's interactions with the user. Hirsh et al. (2000) refer to Incremental Probabilistic Action Modeling (IPAM) method as an instance of such an algorithm. It learns to predict the actions of a user interacting with a Unix command-line shell. IPAM simply records the commands observed to date, and for each command maintains a probability distribution over all commands that may follow. In a study involving 77 Unix users, Hirsh et al. (2000) found that this method can predict a user's next command with an accuracy of 40%. If the system is able to present a menu of, say, five best guesses, the user's next command is in the list of five guesses almost 75% of the time. Other examples of producing the changes as a function of usage patterns include binding the top-rated commands to shortcut keys on the user's keyboard (Korvemaker & Greiner, 2000), providing the user with a check-box list of possible text completions in a note-taking interface (Schlimmer & Hermens, 1993) or on a browser's URL-box (cf., Netscape Navigator and Microsoft's Internet Explorer).

An aspect ignored by Kobsa but which should nevertheless be associated with the observable usage group is content-based personalisation (cf., Hirsh et al., 2000). In this method, the semantics of the viewed web page is utilised to find and recommend pages

that have a similar profile to the one being viewed. The next section discusses this feature in more detail.

Environment data is the third and final acquisition area in Kobsa's model. The range of *hardware* and *software* on the client side of web-based systems is extremely wide (GVU, 1998). It is therefore expected that the content presented to the user should vary as a function of the capabilities of the user's system. Also, information about the *usage locale* can be used to filter content. The relevant areas here are user's current location, ranging from country-specific aspects to the direction of gaze, and characteristics of the usage locale (e.g. noise level and brightness).

To acquire a clearer picture of how exactly adaptive techniques may be incorporated, the next section focuses on two adaptive methods – content-based and collaborative filtering.

1.4.2 Content-based versus collaborative filtering

Both content-based and collaborative filtering could be conceived of as being parts of the observable usage data – group. These techniques utilise statistical algorithms related to principal components analysis. As mentioned previously, content-based filtering is concerned with creating a profile of the content of the web page the user visits and then retrieving novel pages containing a similar profile, and thus similar content. In collaborative filtering the user rates items – books, films, restaurants, etc. – according to whether she likes them or not. The system then identifies a set of individuals whose profiles correlate to those of the user. The preferences of these like-minded consumers are then used to produce the product recommendations (Blom, 2002).

Content-based personalisation methods base their predictions on the contents of the artefacts about which they are concerned. Hirsh et al. (2000) cite News Dude (Billsus & Pazzani, 1999) as an example of such a technique. This software downloads news stories on such topics as politics, business, and sports. These stories are presented to the user, who is then able to rate the articles according to whether they are interesting or not. To predict whether its user will be interested in a new story, News Dude forms a content-based profile, where similarity to other articles is based on co-occurrence of words appearing in the stories. The downside of this filtering method is the fact that only a single user is considered (Hirsh et al., 2000), which leads to a reduction in the item-space from which all future recommendations will be drawn (Smyth, 2000). That is, it relies on

recommending items similar to items a given user liked previously. A further problem associated with this method is that it may not always be possible to develop a suitable content description language in the first place (Smyth, 2000).

Collaborative filtering disposes of the problem of knowledge engineering, as it relies on correlation techniques that are imposed on a set of explicitly expressed interests. An example of such a method is the previously mentioned Moviecritic.com. Here, one has to rate a minimum of ten films after which one can start browsing through the database of films and on each of these, receive a prediction from behalf of the system as to whether that particular movie lies within the interest scope of the user. The more films one rates, the more accurately the system predicts. Collaborative filtering also has its drawbacks. Smyth (2000) states that it is not suitable for new items as, by its nature, it is available for recommendations only when a considerable number of individuals have rated it. Moreover, it does not necessarily apply to "unusual users" – there is no guarantee that a set of recommendation partners will be available for a given target user.

Given that these methods both suffer from drawbacks dissimilar to each other, and that they rely on different sources of information, one could assume that a combination of these techniques would yield better predictions than the use of either of the singular methods. The expectation here is that the more cues there are of linking individual as well as collective experience with the present conditions, the better chances there should be of predicting the user's actions (Hirsh et al., 2000). There is evidence that suggests that when combined, these methods do indeed yield high precision. Smyth (2000) has developed a personalised Internet service called "Personalised Television", which serves personalised TV listings content to over 20 000 users in Ireland and the UK. This system incorporates both content-based and collaborative filtering and when tested with 310 users, 97% of the population rated the success of the predictions as either satisfactory or good.

At present, it is impossible to tell which personalisation technique will become the industry standard as the engine for RSs. What can be concluded, however, is that currently there exists a wide range of techniques and algorithms that are being utilised on a number of different areas of recommendation. This may indicate that there simply is not one single algorithm suitable for all areas. Rather, the production of personalised information is context-dependent, being sensitive to both the user population and the nature of the objects of prediction. This conclusion may be taken to apply to the entire section on system-initiated personalisation techniques. Kobsa's acquisition data model brought with it a great number of techniques suitable for a variety of usage contexts and areas of

personalisation. Sometimes it is useful to monitor the mouse-clicks performed by the user, whereas in other situations a more suitable technique is to ask the user to explicitly state her interests. Section 1.4.3 investigates how user-initiated personalisation technologies be characterised.

1.4.3 User-initiated personalisation

People commonly personalise places and objects in their surroundings and there is a research literature describing how people personalise their office spaces (Scheiberg, 1990; Wells, 2000), isolated environments such as polar stations (Carrere & Evans, 1994), dormitory rooms (Vinsel et al, 1980) and hospital wards (Holahan & Saegert, 1973). The same phenomenon can be observed in the way individuals decorate certain electronic products. Mobile phones are now sold with replaceable colour covers. Operator logos and ringing tones can be downloaded from the Internet. Extensive changes can be made to the appearance of the desktop of a PC as well. Web portals, such as Yahoo! and Excite, allow the user to change the style scheme of the page (Blom & Monk, in press).

Whilst the development of system-initiated personalisation techniques has been under an increasing attention, user-initiated personalisation is not commonly cited. This could be because many do not regard user-initiated personalisation as an instance of personalisation (cf. Allen, 1999). The acquisition data model cannot be used to describe user-initiated personalisation because, by definition, the user initiates the changes here and does not require data from the system to figure out what to change. An alternative way to formulate user-initiated personalisation is to provide an example of each area of personalisation where changes take place, i.e., functionality, interface, information content and appearance. Each of these areas is described in a separate section.

1.4.3.1 Changing the functionality

It could be suggested that personalising the functionality of a system is more often user-initiated than system-initiated. This may be because changes to the functionality would normally require the system to observe the user for a relatively long time to detect changes

needed to improve the user's interaction with the application. One of the most common instances of user-initiated personalisation of functionality is affecting the preferences of one's browser. Many aspects of the browser can be personalised, such as the desired start page, whether or not cookies are accepted, enabling auto-completion for the URLs, etc. It is likely to be the case that this aspect of personalisation is more likely to be carried out by expert users than by novices, as the latency for initiating changes may grow when the user gets more familiar with the functionality of the particular software.

1.4.3.2 Changing the interface

It is debatable whether the user should be allowed to change the interface of the system she's using. For instance, Nielsen (1998) states that if the information space of a site is designed well, then navigating is easy, and the user acquires optimal information through the use of natural intelligence rather than artificial intelligence. The underlying assumption behind Nielsen's position seems to be that a well-designed site should not, and does not need to be, changed. This idea applies well to the user making changes to the interface, as it is often the case that the designer of a particular piece of software is more aware of issues relating to the ease of use of the interface. There seems to be a trade-off here between flexibility and usability, and it is likely that finding the right balance will be difficult for the designer.

1.4.3.3 Changing the information content

Excite.com provides us with an example of the typical ways in which the user can affect the information content of an application. When personalising the portal, there are three columns on the page from which the user is free to allocate links from the following areas: News, Business, Sports, Weather, Entertainment, Fun stuff, Community, Travel, and Personal tools. The list is long, which implies that the user is provided with high flexibility in selecting the content to be viewed.

1.4.3.4 Changing the appearance

Finally, a user may also influence the appearance of a system. As mentioned above, the changes do not need to apply to the software, one can also make cosmetic changes that affect the hardware of the device. A famous example of user-initiated changes to the appearance of a system is Nokia's 5110. When buying this handset, one is often provided with a set of replaceable colour covers that can easily be changed.

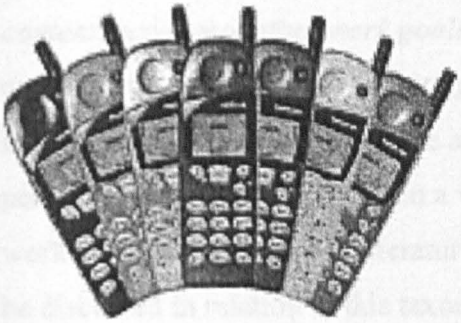


Figure 1.2. Nokia 5110 is sold with replaceable colour covers.

A popular example of software-based changes made to the appearance of the system is personalisation of the desktop of one's computer. The possibilities for change in this context are numerous, ranging from the resolution of the screen to the use of desktop themes comprising of icons, desktop wallpaper, sounds, and screensavers.

Section 1.4.3 indicated that not much research has been conducted on any of the areas of user-initiated personalisation. This is surprising because most systems provide the user with at least some chances of personalising aspects of it. Work-related applications often allow the user to personalise the toolbars, whereas devices designed for more social contexts seem to allow the user to influence the appearance of the product. In summary, there is a wealth of user-initiated personalisation features, but systematic approaches to characterise these technologies are still lacking.

The present section looked at a computer science view of personalisation. Section 1.5 introduces a user-centred perspective. As discussed previously, for whatever reason, this approach is not as common in the personalisation literature as the marketing or computer science approaches.

1.5 Personalisation: user-centred perspective

Blom (2000) proposes a taxonomy for personalisation that centres around the motivation of an individual to personalise a system. The taxonomy provides a user-centred view of personalisation, as the main question is: why do people personalise? In the taxonomy, motivations for personalisation are divided between those that are primarily to facilitate work and those that are primarily to accommodate social requirements. The former motivational category contains three subcategories: *enabling access to information content*, *accommodating work goals*, and *accommodating individual differences*; the latter contains two subcategories: *eliciting an emotional response* and *expressing identity*. Blom's taxonomy presents a wide approach to viewing personalisation from the user's perspective, as it concentrates on a variety of contexts of personalisation, ranging from work to social aspects. The literature relating to the user-centred perspective will therefore be discussed in relation to this taxonomy.

1.5.1 Work-based motivation to personalise

The three categories in the work-related motivation category include access to information content, task-accommodation and individual differences. Each of these will be discussed below.

1.5.1.1 Enabling access to information content

When adopting the point of view of marketing, research indicates the importance of personalisation: Research carried out in the UK found that web users who configure, personalise or register on web sites are more than twice as likely to buy online than those that do not. 68% of web users that personalised a site had made a purchase online, compared to 28% percent that had not used personalisation (Cyberatlas, 1999). Even though it is possible that personalisation and buying online co-vary instead of the former causing the latter one, it is nevertheless conceivable that personalisation increases the readiness to engage in interaction with a vendor. If the vendor is able to provide the user with personally relevant information, then it is likely that the satisfaction towards this

service will be improved. It is therefore not surprising that personalisation has attracted increased attention within eCommerce practitioners. In line with this, Hermans predicts that

> "...the whole process of obtaining information and services through the electronic market place will be enhanced and catalysed in various ways, and will be more personal as to fit the personal needs and preferences of each individual" (Hermans, 1998; p.17).

This idea captures well one important motivational aspect of why users – and service providers – might want to personalise. The amount of information on the Internet is huge. Consequently, we need effective means to filter the information that we attend to. Personalisation becomes a relevant factor here as it allows us to dedicate our limited time and capacity to aspects of information that are personally meaningful to us.

1.5.1.2 Accommodating work goals

Personalising the toolbars of a word-processing application is a stereotypical example of personalisation to accommodate work goals. Here the process would mainly be motivated by a need to accomplish a task efficiently.

Page et al. (1996) studied the personalisation of work-related software. They found that 92% of the users of word processing software personalised it. Page et al. attributed this to work needs: the more the software was used, the higher the level of personalisation. Many times, when using, e.g., a word-processing application, the users notice factors that frustrate them in the functionality or the interface of the software. Constructing a personal toolbar displaying frequently used functions could alleviate this. Mackay's (1991) work falls within this context. She studied employees at MIT personalising their software and found the following reasons to be the biggest triggers for customisation: (1) Automation to avoid repetition; (2) Modification of the changed (e.g., upgraded) software to make it act as it did before the system change; (3) Stopping something that is annoying or slow. All of these triggers, could be argued, are associated with the accommodation of work goals. An interesting finding by Mackay was that the users often customised to maintain a stable interaction with the software. Thus when upgrading their software, they made changes to

the new application to make it more consistent with the old one. This idea is supported by the notion of action-effect consistency (Monk, 2000), i.e., the idea that a particular action should have the same effect irrespective of the context.

1.5.1.3 Accommodating individual differences

It is conceivable that individual differences between users and user-groups, that is, differences in traits and abilities of individuals that can be measured with the help of psychological tests, have an influence on the performance on a particular piece of software. A need to personalise the system to accommodate these differences would therefore arise. The most stereotypical example of personalising for the sake of individual differences is to overcome the constraints imposed by *physical disabilities*. Disabilities in, say, hearing or vision, have direct consequences on the usage abilities of a system. Currently many devices take into account users with disabilities. For instance, cash dispensers are equipped with Braille-symbols and/or audio output and the resolution and colour contrast of a computer can be changed so as to match the user's visual abilities.

Wan Tan (1991) and Benyon & Murray (1993) have conducted research on the link between personalisation and individual differences in cognitive abilities. Wan Tan (1991) investigated individuals using an office automation system. He found that, in contrast to the control group where customisation of software did not take place, *cognitive styles* of the users did not have a significant effect on the success with that system which had user interfaces customised before the experiment. Thus, he concludes,

> "Technological advances [the ability to personalise, for instance] reduce the effect of the cognitive style of the user on the performance on an information system" (p.309).

Benyon & Murray, on the other hand, state that *spatial ability* and *field dependence* are particularly important cognitive characteristics of users, which have a significant effect on the quality of the interaction (1993). Another important one is the *user profile*: Benyon & Murray (1993) found that frequency of computer use and knowledge of generic systems (command languages in this case) had an effect on the interaction.

More exotically, individual differences in personality may also play a role. Reeves & Nass (1996) were interested in whether controlling the 'personality' of a computer has a differential effect on users who are located on opposite ends of a single dimension of personality called *extroversion* or dominance/submissiveness. They constructed a simple interactive task with the computer in which the software was using either dominant or submissive dialogue. This was manipulated in a number of ways, such as by varying the language style and level of confidence of the linguistic output. Half of the participants with a dominant personality and half with a submissive personality were assigned to the dominant computer whereas the other half was assigned to the submissive computer. It was found that dominant participants preferred the dominant computer, whereas the submissive ones showed a clear preference for the submissive one. Moreover, the participants also enjoyed themselves more and had more fun when there was a match between the personalities of the computer and the participant.

A problem arises if the change in the system is introduced after a learning period during which the software has determined the characteristics of the individual, as would be the case in some system-initiated personalisation technologies. Regardless of the fact that the change takes place for the sake of the user, adaptivity may nevertheless increase the cognitive load of the user in which case this process may be unacceptable. Results from a follow-up study conducted by Reeves & Nass (1996) actually suggest that adaptivity may be acceptable, provided the change that takes place results in greater consistency between the character of the individual and the system. An experiment resembling the one mentioned above was conducted, with the exception being that – for half of the subjects - the style of the dialogue was changed in the middle of the interaction. The result of this experiment was that - in both personality groups - the participants liked the computer more when it changed to conform to their respective personalities than when it remained similar. Reeves and Nass believe this finding to be in line with the so-called gain theory, which postulates that people like to gain something rather than always have it.

In addition to the work-based aspects discussed in this section, Blom (2000) states that socially-based usage motivation also influences the need to personalise.

1.5.2 Socially-based motivation to personalise

The relevant areas in this section include personalisation to elicit an emotional response in the user or to express the identity of the user.

1.5.2.1 Eliciting an emotional response

Susan Scheiberg (1990) investigated the personal decoration of workspace. She studied two different units at an American university, one of which incorporated extravagant and the other one subdued personalisation of workspace. While the units can be seen as representing opposite ends of the continuum of office appearance, both types of employees personalised their workspace and found the process to be meaningful. She found that there existed two kinds of personalisation: one had to do with unconscious outlet of emotions and it was characterised by transient decorations. The other personalisation style was associated with purposeful and intentional decoration of one's space. This, according to Scheiberg,

> "seems to provide specific and concrete stimuli to which the individual will have a predictable emotional response...Personalisation of space acts as reflexive communication - through emotional responses to items that surround them, employees design a workspace that speaks to them and aids them in their day-to-day functioning, both emotionally and intellectually" (p.335).

Scheiberg implies that the role of emotion is predominant in this kind of personalisation. By imposing the function of a trigger on external stimuli, we may control our emotions and counterbalance negative emotional states. If people personalise their workspaces for emotional reasons, this may also be the case in the HCI context. It may be that when using software for work-related, purely instrumental purposes, we personalise to optimise work. However, it is conceivable that in many cases we actually make the decision to customise the system because it involves emotions. The findings of Makela et al.'s (2000) support the idea that emotional expression plays a role also in the context of HCI. They performed a field study that involved a group of children in Finland and Austria using a mobile device to send digital images to each other. One of the main findings was that the images

that were sent were used for expressing emotions. Essentially, there seemed to be a shift from a task-related domain to a more emotional and social one. Thus, by using a ringing tone in a mobile phone that is personally relevant to us, we may predict the kinds of emotions that we might be experiencing when we hear the tone. The melody would be facilitating our well-being by triggering positive feelings.

In addition to Scheiberg's (1990) sociological approach to investigating the link between personalisation and emotional involvement, studies performed in environmental psychology also provide understanding regarding this association. Wells (2000) found a correlation between employees' well-being and personalisation of office space. A more thorough account than that of Wells (2000) was provided by Heidmets (1994). He believes that man personalises objects in his environment to signal ownership, control and identity. The ideas of these authors are central to subsequent theoretical developments in the thesis. Their work will be discussed in greater detail in Section 7.4.3.

To conclude, it is likely that personalisation, particularly when user-initiated, triggers positive emotional responses in the user. On a more generic level, this process may result in satisfaction and well-being, both of which are desirable features of system usage.

1.5.2.2 Expressing identity

Self-expression can take place by means of extending the self to the environment. A person might dress as a function of her personality or profession, or she might indicate her political beliefs by listening to certain kind of music. Thus, in addition to personal possessions exhibiting instrumental value, the symbolic aspect of objects is also relevant (see Dittmar, 1991). Extending oneself with the help of external objects has indeed been found to possess communicative value. Burroughs et al. (1991) demonstrated that personal possessions, i.e., extensions of self, may be used by others quite accurately to evaluate the personality of the owner of the possessions. Burroughs et al. found that their participants could make personality inferences that were consistent with self-ratings made by the owners of the possessions. In line with this, Dittmar (1991) proposed that a highly significant aspect of material objects is that they serve as symbolic expressions of who we are. It is not surprising, therefore, that in examining preferences for products as diverse as automobiles, food products, clothing, and home furnishings, researchers have shown that

individuals prefer products that they perceive have images similar to themselves (Burroughs et al., 1991).

DePaulo (1992) suggests that in social interactions, people often exert some control over their nonverbal expressive behaviour. In this context, we are looking at self-presentation - behaviour that is aimed at controlling the self-relevant images one projects to others (Schlenker, 1980). DePaulo cites Goffman (1959) to be one of the first to recognise self-presentational significance of expressive behaviours. Goffman uses the term "personal front" when talking about the expressive equipment employed by the individual during his "performance". This, according to Goffman, refers to the items we most intimately identify with the performer himself (p.34). Thus, as part of personal front we may include insignia of office or rank, clothing, sex, age, facial expressions, etc. Importantly, it is not only the behaviour that can be used for expression, external artefacts can also be employed to convey a meaning.

Externalising oneself using material objects is not necessarily a one-way process that serves to affect others' beliefs regarding ourselves. We are dealing with a social environment, which in turn makes self-presentation a reflexive activity. This idea has its roots in symbolic interactionism, which suggests that a central portion of the self-concept is the result of acknowledgement from others (Burroughs et al., 1991). Thus, these authors suggest that

> "in social interactions, a symbol system of actions, gestures and objects will be used by individuals in self-presentations that have the goal of establishing and maintaining a personal identity. The totality of these self-presentations will, in turn, mould and modify an individual's self-concept" (p.148).

The importance of the social dimension contrasts with the view that the private self is the core of one's inner being. With the public self, or the self as it is projected in one's social life, the self becomes transient, chameleonlike, and deceitful (see e.g. Schlenker, 1980). Instead of looking at the social dimension as an impediment to the knowledge of self, we should acknowledge the contribution of the social aspects in shaping our identity.

As an example of the environment contributing towards the integrity of the self, Kamptner (1991) found that especially in the late adulthood, people tend to value the material possessions as markers of the relationships that comprise one's lifelong sense of self. Similarly, Csikszentmihalyi & Rochberg-Halton (1981) studied the ways people

carve meaning out of their domestic environment through interviewing eighty families in Chicago on the subject of their feelings about common household objects. In the model of personhood that these authors develop, integration of self through objects assumes central importance:

> "Humans display the intriguing characteristic of making and using objects. The things with which people interact are not simply tools for survival...Things embody goals, make skills manifest, and shape the identities of their users. Man is not only *homo sapiens* or *homo ludens,* he is also *homo faber*, the maker and user of objects, his self to a large extent a reflection of things with which he interacts. Thus objects also make and use their makers and users." (Csikszentmihalyi & Rochberg-Halton, 1981; p. 1)

By looking at the discussion above, it is conceivable that personalisation, especially personalisation of appearance of the device, may be associated with a function related to identity expression. This could be relevant in various contexts. Most overtly, Bickmore et al. (1998) refer to animated autonomous personal agents, which could represent a given individual on a personal web page. They propose the use of an agent interface that the user can identify with and that would thus serve as a useful representation of that particular user. The communicative goals of the user would hopefully be fulfilled, and moreover, the satisfaction towards the web page would probably be high. A phenomenon consistent with the ideas of Bickmore et al are MUDs (multi user dungeons, a web-based role game) where users create virtual, text-based personae of themselves on the web. In her book *Life on the Screen*, Turkle (1996) discusses the link between an individual's digital representations on MUD and the self:

> "A MUD can become a context for discovering who one is and wishes to be. In this way, the games are laboratories for the construction of identity." (p. 184)

The notion of MUDs acting as social laboratories for an individual is essential for Turkle. Through the use of multiple digital personae we self-fashion and self-create. Each representation on the Internet may represent a given aspect of the self. Ultimately, we are

"...experimenting with the constructions and reconstructions of self that characterise postmodern life" (p.180).

Turkle's ideas parallel the issue of personalisation and identity expression. Both a digital persona and a personalised device could serve the same purpose: externalisations of the self to experiment with, integrate, or maintain one's personal identity. Direct support for personalising for the purposes of identity expression comes from the above-cited study by Mäkelä et al. (2000). In addition to using the images for eliciting emotional responses, usage situations emerged where the personalised digital images were used for expressing affection and spirituality. In other words, self-expression was apparent when the participants were allowed to create and share personalised items.

How exactly could a personalised device then enable the expression of identity? For instance, the personalisation of a search engine to display the kind of information one is interested in could potentially allow self-externalisation and identity reflection. Personalisation of appearance of the system is even more potential an area. Here the possibilities for identity expression are in many devices almost endless. In mobile phones, the user may customise the operator logo, ringing tone or phone cover. There is a whole industry providing these features, which consequently implies that the user is provided with a wide selection of personalisation features to choose from. One would therefore imagine that it is easy for an individual to choose items that reflect her personal identity.

An interesting question that raises issues for future research is whether personalisation is also associated with expressing identity at a group level. A finding that supports this notion is the existence of so-called tailoring cultures in certain work places. It has been found that users customise as a result of co-operation with others. In a study by MacLean et al. (1990), novice users' systems were seeded with sample custom tools built by expert peers. It was also possible to share customisation files through e-mail. As a result, it was possible for these users to become proficient at customising their software. Mackay's findings (1991) provide support for this. She observed that all users in her study borrowed some or all of their customisation from other people in the organisation. She believes that this collective element is one of the triggers of the personalisation process and suggests that software producers should therefore permit users to capture individual patterns of use and share them with others. Although the examples cited above refer to inter-person personalisation for utility-related purposes (e.g., optimising the use of a word processor),

it is conceivable that this kind of shared personalisation activity could also help express aspects of group identity.

1.6 Discussion – three perspectives on personalisation

The first part of this chapter was concerned with defining the concept of personalisation. The definition adopted depends on two key distinctions, where personalisation is initiated and what objects are changed. To elaborate on the first point, personalisation can be system or user-initiated, with the former being associated with artificial intelligence-based techniques and the latter with the user possessing an active role in the process. Second, the objects of change refer to changes influencing the functionality, interface, information content or appearance of the system. Personalisation was also contrasted with personification, the degree to which the interface projects itself as human. The definition of personalisation that was introduced in this chapter will be used as the working definition of the process throughout the thesis.

This chapter related existing literature to the process of personalisation, as defined above, from three distinct perspectives: marketing, computer science and user-centred. To summarise these approaches, the marketing literature views personalisation as a means of increasing customer trust and loyalty. This perspective can be criticised because most of its assumptions are based on correlational methods of investigation that are unable to establish a causal relationship between personalisation and customer satisfaction. The research conducted from the computer science perspective, on the other hand, concentrates on analysing and improving the architecture of system-initiated personalisation technologies. The main conclusion in regard to the computer science perspective is that there is a wealth of personalisation techniques being utilised. The way in which the user data is acquired ranges from observing usage regularities to explicitly prompting the user to state her interests. Importantly, there does not seem to exist an optimal personalisation technique, i.e., a feature suitable for all possible usage contexts. Rather, the production of personalised information is context-dependent and is sensitive to both the user population and the nature of the objects of prediction. It is not surprising, therefore, that Kobsa's (1999) acquisition data model is associated with a great number of techniques suitable for a variety of usage contexts and areas of personalisation. Sometimes

it is useful to monitor the mouse-clicks performed by the user whereas in other situations a more suitable technique is to ask the user to explicitly state her interests.

Little is established as to whether personalisation is beneficial to the user. This is a peculiar situation; it is analogous to speeding up a train of whose direction is unknown. The user-centred perspective that was discussed in section 1.5 took a step toward increasing our knowledge of the user's perspective. The approach was based on Blom's (2000) taxonomy, which sets out the motivational forces that influence a user's decision to interact with a personalised application. Work-related and socially-related motivations were relevant here and the literature associated with these areas was discussed. The advantage of the motivational account is that it may help us design personalisation technologies that cater for the needs of the users.

The examples below, taken from Blom (2000, p. 314), illustrate the motivational taxonomy by imposing it on personalisation features being incorporated on mobile phones and eCommerce web sites. In each case, in addition to taking into account the motivational factors also the object of personalisation and degree of initiation in the process (5-point scale where 1 refers to extreme user-initiation and 5 to extreme system-initiation) are determined. The illustrations show how a taxonomic view to personalisation may be useful when classifying personalisation technologies from the point of view of the user.

Examples of personalisation - Mobile phone

Function 1: Appearance

Process: The user chooses a colour cover or attaches a sticker on the phone; the change persists in the system.

Degree of initiative (user versus system): 1.

Possible motivations: Identity (e.g., promoting a 'wild' self-image), emotional response (e.g., attachment to the phone).

What is changed: Distinctiveness.

Function 2: Personal ringing tone

Process: The user selects, orders, or composes the tone; the system memorises the change.

Degree of initiative (user versus system): 1.

Possible motivations: Individual differences (e.g., choose a tone that can be easily heard), identity, emotional response

What is changed: Interface and distinctiveness.

Function 3: Caller recognition

Process: The user associates an identifier (ringing tone, image, or name) with the event of a specific person or a person belonging to a particular group calling the user; the association is memorised by the system.

Degree of initiative (user versus system): 1.

Possible motivations: Access to information, individual differences, emotional response, and identity.

What is changed: Interface, information content, and distinctiveness.

Examples of personalization - eCommerce web pages

Function 1: Making the interface suitable for visually impaired

Process: The user enlarges the font size or increases the contrast of the front; the system memorises the change.

Degree of initiative (user versus system): 1.

Possible motivations: Individual differences.

What is changed: Interface.

Function 2: Receiving information of the area of interest

Process: The user indicates which areas she is interested in; the system memorises this and will notify the user about items that fall within these defined categories (e.g., personalised news services, such as InfoComm.ca).

Degree of initiative (user versus system): 3.

Possible motivations: Access to information.

What is changed: Information content.

Function 3: Recommending products on the basis of preferences of similar-minded consumers

Process: The user submits personal information (e.g., feedback or ratings) to the system; the system uses a technology such as collaborative-based filtering *(Guttman, 1998)* to recommend products to the user. Services such as Amazon.com and Moviecritic.com utilise this feature.

Degree of initiative (user versus system): 4.

Possible motivations: Access to information, identity (the recommendations may support the user's self-image), emotional response (the user is positively surprised about the relevance of the recommendations).

What is changed: Distinctiveness, information content.

Though the taxonomy was related to previous research, it is nevertheless speculative and limited as it lacks empirical support. Further, even if it managed to provide a reliable picture of the motivations behind the process, it nevertheless fails to capture the implications of the process.

The aim of this thesis is to establish an empirical foundation and body of knowledge with regard to the user implications of personalisation in the HCI context. For instance, how can the user experience associated with interacting with personalisation technologies

be characterised? What is it that triggers personalisation and furthermore, what are the psychological consequences of this process? As yet, there are no answers to these questions. A major challenge, therefore, is that of learning how to operationalise personalisation. There is a methodological issue that should also be addressed. That is, the nature of the most suitable research methodology for investigating personalisation remains unknown.

Given these questions, two main objectives were set for the thesis. First, the research was hoped to result in empirical knowledge regarding the user experience associated with the use of personalised electronic products. A reasonable product was thought to consist of an initial theory of a specific instance of personalisation, a theory that would include empirical support and open up interesting avenues for future research. Second, a number of research methods were incorporated, ranging from quantitative to qualitative, to identify the optimal ways of investigating this area.

The connection between personalisation and personification served as an interesting starting point for the research. It was argued in section 1.2.2 that the use of a human-like interface is often understood as an instance of personalisation. Our definition of personalisation did not regard personification as an instance of personalisation, although it was argued that these two notions have parallels. Both processes can be seen as ways of increasing customer satisfaction and furthermore, both could be conceived of as processes that increase the personal nature of the service.

In Part 1, an experimental paradigm is incorporated that was hoped to result in knowledge of the impact of personalisation and personification on shaping the user experience. A shift to a more specific perspective of personalisation is taken in Part 2, where two personalisation technologies are qualitatively investigated. Part 3 returns to the quantitative paradigm by validating the Theory of Personalisation of Appearance, which was developed in Part 2.

Chapter 2. Experiment 1: Exploring the effects of personalisation and personification on online user experience

2.1 Introduction

This chapter describes an experiment to explore the effects of personalisation on the user experience. In addition to the theoretical knowledge gained, the experimental paradigm was assessed as a feasible methodology to study personalisation. The use of a web site was thought to provide a naturalistic setting because web content is often personalised. A web-based scenario also enabled the sessions to take place outside the laboratory, such as at home or in a computer room, increasing the ecological validity of the experiment. A further advantage of using a web-based procedure was that the construction of a dynamic web site using a server-side technology made the manipulation of the independent variables flexible.

The scenario used for the task was online banking, as it enabled the construction of a range of motivating and realistic tasks. The participants were asked to imagine a scenario where they were about to travel abroad for a holiday. Prior to travelling, they were asked to accomplish a few financial tasks using Digital Bank, a fictional online banking application designed by the experimenter. The participants were asked to buy travel insurance, sell shares, pay bills, and check their balance. The interaction took take place over two distinct sessions, thus enabling the users to engage with the personalisation features over a longer period of time.

2.1.1 Personalisation features

Participants completed the task in one of two conditions – personalisation present or personalisation absent. In the personalisation present condition the web site used altogether nine personalisation features, all of which were realistic in a financial context. Table 2.1 lists the personalisation features that were incorporated in the task. It also illustrates how the control condition 'personalisation absent' was carried out. To enable a further analysis of the features, the second column from the right indicates whether the

given personalisation feature is user-initiated or system-initiated. The right-hand column indicates the object of change (appearance, information content, interface or functionality).

	Personalisation feature		Initiation	Object of change
	Personalisation present	Personalisation absent		
1*	The user is asked to personalise the slogan, logo, and colour scheme of the main page (see Figure 2.1 for an illustration).	The user goes through the same selection process but she is told that it for the sake of "future development". No personalisation takes place despite the equivalent amount of interaction.	User	Appearance (main page)
2*	The user is prompted to select the kinds of news she wants to be displayed on the main page.	The user goes through the same selection process but she is told that it for the sake of "future development".	User	Information (news)
3*	The user is prompted to select the kind of advertising that will displayed on the main page of the site.	The user goes through the same selection process but she is told that it for the sake of "future development".	User	Information (commercial)
4	Details of the bill-paying form pre-filled.	The user fills in the information on the form.	System	Information (bills)
5	Information on the types of shares other customers have bought is displayed to the user.	No information available on other customers' share transactions.	System	Information (financial)
6	The user is provided with personalised travel insurance. The recommendation is based on the user's answers regarding the length and destination of the planned trip.	The user fills in the same questionnaire but the insurance scheme that is offered is not based on the details the user has submitted.	System	Information (financial)
7	The system recommends a travel agency on the basis of the fact that the user is a university student.	The same travel agency is recommended without justifying the recommendation.	System	Information (commercial)
8	In session two, the user is reminded of the kind of commercial information she selected in session one.	The user is not prompted.	System	Information (commercial)
9	Use of the name of the user in several contexts, e.g., "Hello, Jan".	No name used.	System	Information (personal)

* These items were displayed on the main page and carried through into the second session.

Table 2.1 Manipulation of the independent variable 'personalisation'.

The system-initiated personalisation techniques can be categorised in terms of Kobsa's acquisition data model (1999). The features that were used are based on acquiring *user* and *usage* data. The former refers to data relating to the personal characteristics of the user and the latter is based on monitoring the user's interactive behaviour on the web site. Producing pre-filled bill paying forms (feature 4 in Table 2.1), informing her about other customers' share purchasing (feature 5), and reminding the user what kind of information she was interested in during the previous session (feature 8) are examples of the usage data group. Instances of user data, on the other hand, include recommending travel insurance (feature 6) and travel agency (feature 7) and the use of the name of the user (feature 9).

As indicated by the third column in Table 2.1, some personalisation features were user-initiated and some were system-initiated. The objects of change of the process included appearance and information content. These are arguably the most common forms of web-based personalisation, with many web portals such as Yahoo or Excite, for instance, allowing the user to change the appearance and information content displayed. A relatively large number of features was utilised on the experimental web site indicating that the combined effects of personalisation were assessed. An alternative approach would have been to concentrate on only one personalisation feature. The latter approach was thought to be too narrow for the initial study.

To enable personalisation, the web site has to be dynamic, i.e., it has to change as a function of the user's interaction. In addition to the personalisation process itself, the manipulation of the independent variable also required dynamic properties to be present on the experimental web site. The dynamic properties were constructed with the help of server-side technologies. ColdFusion was used to create the applications, which enabled the use of conditional statements and a database.

2.1.2 Personification

The second independent variable in the experiment was personification, the degree to which the interface presents itself as being human. As discussed in Chapter 1, personification is not necessarily an instance of personalisation. A personified interface can be the same for all users whereas personalisation always requires changes to be made for a particular user. These concepts are similar, however, as both contribute to the

personal nature of the service or product. Contrasting the effects of personalisation with the effects of personification added an interesting dimension to the experiment. The experiment was carried out as a 2 by 2 between subjects design. The two levels of personification were human versus machine. The human condition was designed to emphasise a service team behind the interface. The machine condition, on the other hand, was meant to elicit a system-like image of the service.

The personification of the interface was achieved by introducing a personal service team that handled the data submitted by the user. The introduction of the team took place in Session 1, when the user logged on to the site for the first time. The dialogue style was polite throughout the sessions and emphasised the presence of a service team. Images of human beings were displayed on the site. In the machine image condition, no indication was given as to who handled the data submitted by the user. The dialogue style was less polite and images portraying system-like features of the bank were used to decorate the site. Table 2.2 lists the features that were used to manipulate this independent variable.

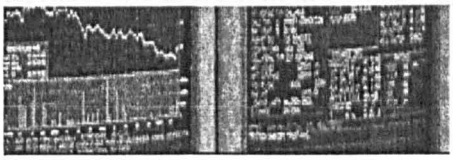
Level of personification: human image	Level of personification: machine image
Introduction of a service team in session 1 that handles the data submitted by the user on the first page of the first session. An image of the team was shown to the users.	No indication given to the user as to who is handling the data submitted by the user.
Use of a logo on top of the main page containing people: 	Use of a system-based logo on top of the main page: 
Use of human-like dialogue that emphasises the presence of the service team, such as "We'd like you to fill in the form below". The effect was achieved by making the dialogue style more polite and using 'we' instead of 'it'.	System-like dialogue, such as "Fill in the form below". This was done by minimising the length of the dialogue and by abiding to third person verbs. The dialogue was not polite.

Table 2.2 Manipulation of the independent variable personification.

In summary, the human image condition represents a highly personified interface. The user knows whom she interacts with and the dialogue style and graphical content of the site are both associated with a human image. The system image condition has little

personification. Here the user does not know whom she is interacting with and there are no associations in the graphical appearance of the site to a human image.

2.1.3 Dependent variables

As discussed in Chapter 1, there is not much established knowledge on the user implications of personalised interfaces. Consequently, the present experiment had an exploratory nature, using a range of dependent variables.

One important factor was subjective workload associated with the use of the system. Keinonen (1998) argues that measures of mental workload, such as the NASA-TLX, have been successfully used to investigate subjective satisfaction in the context of usability measurement. The NASA-TLX scale was thought to be a viable measurement instrument as it gives indication of the usability of the system as well as workload. That is, workload could be conceived of as the inverse of usability. Mental workload was assessed with a six-item NASA Raw Taskload Index (RTLX). This scale dispenses with the paired comparison stage associated with the NASA-TLX and is based upon a simple sum of scales (RTLX = sum of raw scales/number of scales). Fairclough (1991) has suggested that the RTLX is a superior alternative to the TLX as it is easier to use and from an experimental perspective, the RTLX has been demonstrated to be as sensitive, if not more sensitive than the original TLX.

It was hypothesised that personalisation would decrease the workload associated with the use of the system as it becomes more tailored to the individual needs and abilities of the user. The hypothesised effect of personification on the perceived workload was unclear. It could be the case that a human image is associated with an increase in the perceived workload due to social norms becoming relevant in the context of the image of a service team. On the other hand, it may be the case that a human image alleviates the fear associated with computer use thereby improving the usability of the system.

Another variable on which personalisation was hypothesised to have a positive influence was engagement. Many service providers aim to develop applications that are stimulating and engaging. The ability to personalise the appearance of the interface and receive tailored information may be factors that increase the engagement associated with the interaction process. Similarly, a human image may be expected to result in an increase in engagement because of novelty.

A concept that parallels engagement, and which is referred to more often in the psychological literature is flow state. Csikszentmihalyi (1977) refers to the state of mind associated with becoming absorbed in the activity one is undertaking as flow state. This mode is characterised by a narrowing of the focus of awareness; by loss of self-consciousness; by a responsiveness to clear goals; and by a sense of control over the environment (Csikszentmihalyi, 1977, p. 72). Hoffman and Novak (1996) propose that flow experience is essential to understanding consumer navigation behaviour in online environments such as the World Wide Web. They state that flow has a number of positive consequences, especially from a marketing perspective, including increased consumer learning, exploratory behaviour, and positive subjective experience. Studying flow in the context of personalisation and eCommerce may be important.

It could be argued that the concepts flow and engagement refer to the same construct. The difference between these is that the latter is a more neutral way of characterising this state of mind: flow experience is often used to refer to highly challenging scenarios, such as mountain climbing or programming (Csikszentmihalyi & Rathunde, 1993). The term engagement is more neutral and is therefore more suitable for characterising flow-related online experience.

Emotional involvement associated with the interaction process was also regarded as a relevant issue. This was hypothesised to be positively affected by both personalisation and personification. This is because both of these variables represent relatively unorthodox modes of interaction, thus potentially leading to heightened emotions. The emotional states that were assessed include happiness, playfulness, cheerfulness, enjoyment, satisfaction, surprise, alertness and attachment.

All three of the above variables were assessed using multi-item 5-point Likert scales. Additional questions were also asked, mainly relating to the success of manipulation of the IVs.

In addition to quantitatively assessing the user experience, interviewing users of the site was thought to be a good way of determining aspects of the experiment that required improvement for future studies using this paradigm, and of gaining an insight into the user implications of personalisation and personification.

To summarise, Experiment 1 was carried out to investigate the effects of personalisation and personification on the user experience. The ecological validity of the experiment was optimised by allowing the participants to carry out the experiment outside the laboratory and by using a naturalistic setting for personalisation, i.e., a fictional online bank. The

major objectives of the experiment were to (1) establish a psychological investigation paradigm for personalisation; (2) gain initial understanding on the variables personalisation has an influence on; (3) investigate the interaction between personalisation and personification.

2.2 Method

2.2.1 Design

A 2 by 2 between subjects design was used, with the two independent variables being personalisation (2 levels; personalisation present, personalisation absent) and personification (2 levels, human image, machine image). Each participant completed the experiment in one of four conditions. Table 2.3 outlines the codes that were used to refer to these conditions in this chapter.

		Personalisation	
		present	absent
Personification	human image	P-H	NP-H
	machine image	P-M	NP-M

Table 2.3 Codes used for the four conditions constituted by the manipulation of the independent variables. P=Personalisation present; NP= No Personalisation; H=Human image (personified); M=Machine image (not personified)

2.2.2 Participants

80 participants took part in the study, aged between 18 and 35. Both males and females participated and the subjects were mainly psychology or electronics students at the University of York. They were given money or psychology course credits for participating. Approximately 90% of the participants spoke English as their first language and the foreign language speakers were distributed evenly across the conditions. See Table 2.4 in Section 2.3.1 for further details on the participants.

The subjects were assigned to the groups randomly, with the exception that the ratio of psychology and electronics students was as constant as possible between the conditions. This was done to prevent the potentially deviating personalities and attitudes of these two student groups from confounding the results. For similar reasons, the gender ratio was kept as constant as possible between the groups.

2.2.3 Procedure

To create a prolonged experience with the independent variables the experiment consisted of two distinct on-line sessions. Each session lasted about ten minutes. Neither the time nor the location of completing the session was controlled. In the first session the participants were asked to fill in a membership application form and personalise the settings of their new on-line accounts. This included choosing the types of news, a colour scheme, slogan and a logo to be displayed on the main page. The figure below illustrates the personalised main page of the site. The participants in the groups that did not interact with a personalised interface went through the personalisation dialogue as well, with the difference being that their decisions did not impact the content and appearance of their sites. Instead, they interacted with a default site. This ensured an equivalent amount of interaction between the groups. To make this personalisation process more motivating for the participants in the personalisation absent condition the participants were told that the choices they made were "for the sake of future development of the service".

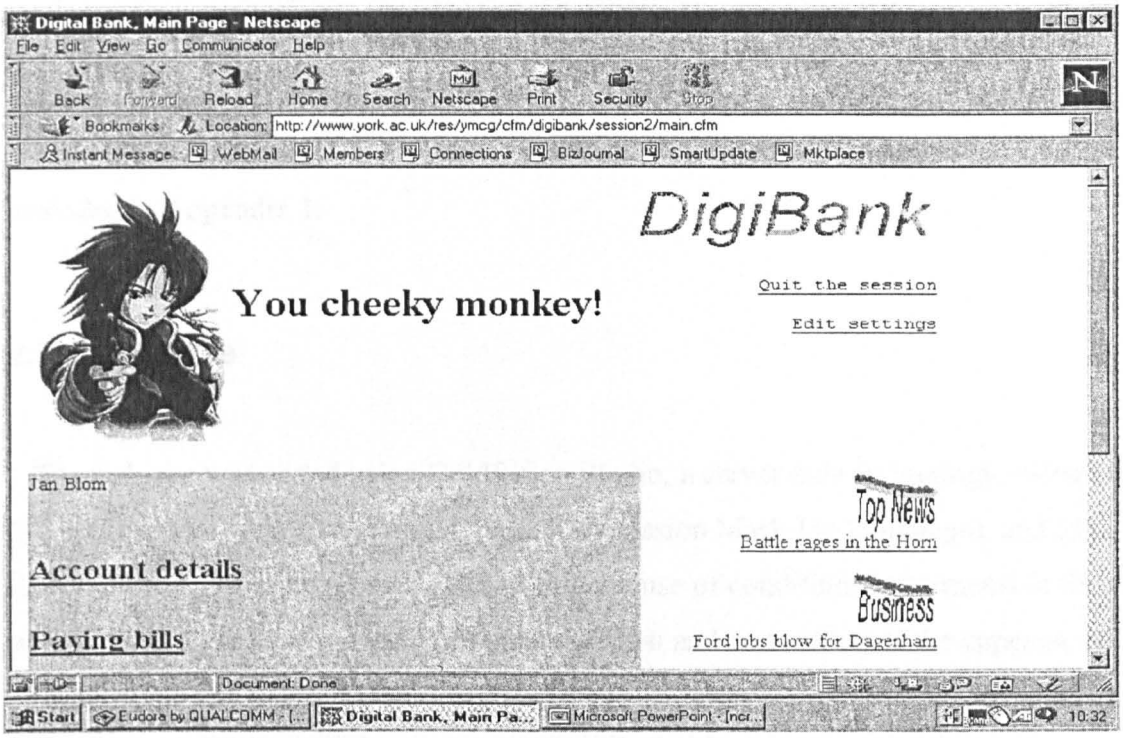


Figure 2.1. An illustration of the personalised main page of the users allocated to groups P-H and P-M. The users were asked to write a welcome slogan ('you cheeky monkey' in the figure), select an image (the cartoon character), select a colour for the main link area and choose the types of news to be displayed on the page.

In Session 2 the users were to prepare for a fictional journey by purchasing travel insurance, by selling shares to get extra cash for the trip, and by paying urgent bills. This imaginary scenario was created to make the tasks consistent with a real-life situation and thereby increase the motivation to accomplish the required tasks. The users were also asked to visit pages containing a financial tip and commercial information. All of the tasks mentioned above were delivered in either a personalised or non-personalised form. The tasks could be accomplished in a varying order but none of them could be omitted. This was achieved by implementing an algorithm in the code that prevented the participants from exiting the session prior to achieving the necessary tasks. The main page also included links to various news items, but the users were not required to visit these links. After each session, the users were asked to fill in a paper-based questionnaire. The sessions were to take place on separate days, again ensured by implementing an algorithm that prevented the users from logging in on the two sessions during the same day.

The instructions were combined with the questionnaires into an experiment package and the participants were also sent an email that indicated the URL for the site containing hyperlinks to each session. It was emphasised that the participants should keep the instructions in front of them while doing the sessions and that they would have to fill in the questionnaires immediately after completing each session. The experiment package is provided in Appendix 1.

2.2.4 Web site

The web site was coded using Coldfusion Studio, a server-side technology, using HTML (HyperText Mark-Up Language), CFML (ColdFusion Mark-Up Language), and SQL (Structured Query Language). CFML allows the use of conditional statements in the code, which enabled the incorporation of personalisation and controlling of the appearance and content of the site as a function of the group of each user. The diagrams below illustrate the individual CFML files, i.e., pages of the web site that were used in the sessions.

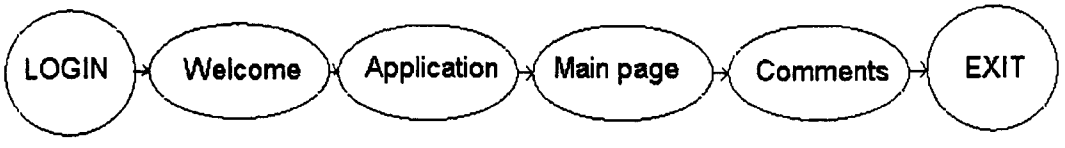


Figure 2.2 Diagram of Session 1 with each element representing a separate page.

After logging in during Session 1, the users were directed to the welcome-page, on which the service team was presented to those in the personified groups. The subjects then filled in the application form after which they were shown a screenshot of the main page. Prior to exiting the application, the participants were allowed to leave comments regarding the session.

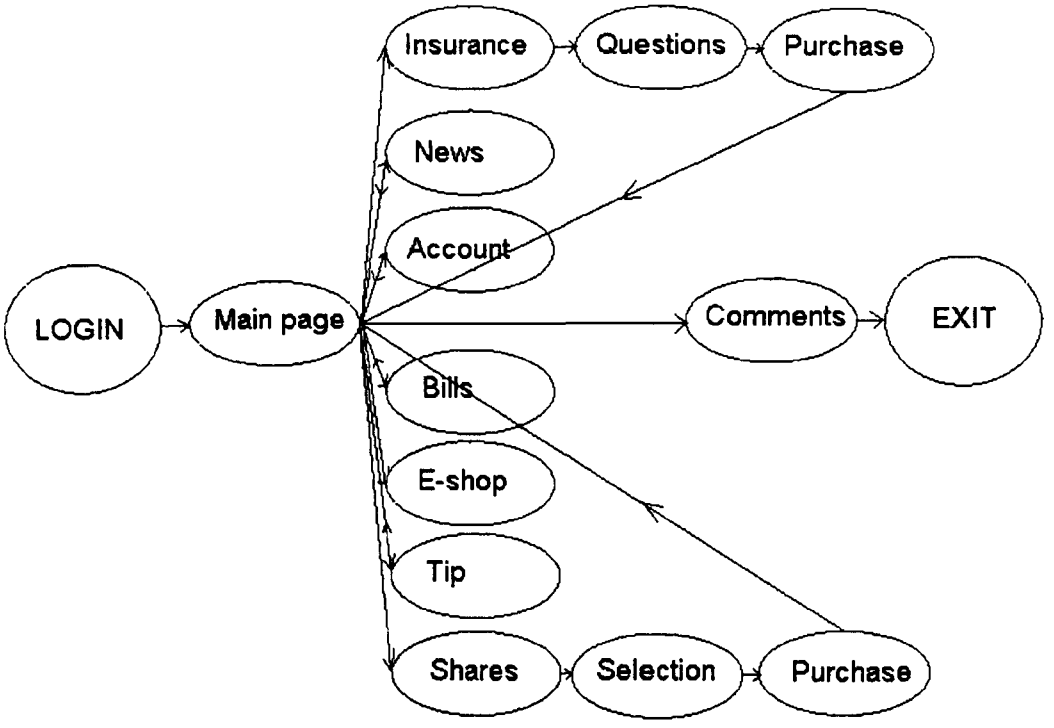


Figure 2.3 Diagram of Session 2 with each element representing a separate page.

In Session 2, the main page followed the login process. The main page contained links to the following applications: insurance purchase, news, account information, bill payment, e-shop, tip of the week, and share transactions. Prior to exiting the application, the participants were allowed to comment on Session 2.

2.2.5 Questionnaires

At the end of each session, the participants completed a paper questionnaire. The questionnaire items can be grouped as follows: (A) engagement; (B) workload; (C) emotion; (D) other items. Engagement was assessed in both questionnaires. The rest of the items were only assessed following the final session. The questionnaires are part of the experiment package, which can be found in Appendix 1.

2.2.5.1 Engagement

A seven-item flow scale (adopted with slight modifications from Csickszentmihalyi & Larson, 1987) was used to assess engagement, both in the first and second questionnaires. Answers were made on a five-point Likert scale ranging from "totally agree" "totally disagree". The items were:

How well were you concentrating?
Was it hard to concentrate?
How self-conscious were you?
Did you feel good about yourself?
Were you in control of the situation?
Were you living up to your own expectations?
Were you succeeding at what you were doing?

An additional flow item prompted the participants to estimate the time they had spent interacting with the application. It was hypothesised that high engagement would lead to a decreased awareness of time spent interacting with the site.

2.2.5.2 Workload

A six-item NASA-RTLX scale (Fairclough, 1991) was used to assess the cognitive workload associated with the interaction. The items were as follows:

Mental demand: How much mental and perceptual activity is required? Was the task easy or demanding, simple or complex, exacting or forgiving?
Physical demand: How much physical activity was required? Was the task easy or demanding, slow or brisk, restful or laborious?
Temporal demand: How much time pressure did you feel due to the rate or pace at which the tasks or task elements occurred?
Effort: How hard did you have to work (mentally and physically) to accomplish your level of performance?
Performance: How successful were you in accomplishing the goals?

Frustration level: How insecure, irritated, stressed and annoyed versus secure, content, relaxed and complacent did you feel during the task?

All of the items were assessed using a five-point Likert scale.

2.2.5.3 Emotions

The extent to which the web site evoked the following emotions in the participants was assessed: happiness, playfulness, cheerfulness, enjoyment, satisfaction, surprise, alertness and attachment. These were assessed using a five-point Likert scale that ranged between "not at all" and "very much".

2.2.5.4 Other items

Participants were also asked to state whether they considered Digital Bank trustworthy and whether they would return to the site. Three manipulation check items were devised to determine whether subjects noticed the levels of the IVs. These items prompted whether the participants regarded the site as human-like or machine-like, whether they knew who they were interacting with and whether they felt the site was tailored to their needs. The two first were checks for personification and the last item was a check for personalisation. These were assessed using a five-point Likert scale.

2.2.6 Qualitative data

Interviewing users with regard to interacting with the site had a dual purpose. First, from the pragmatic point of view, it was hoped that qualitative data would reveal issues that should be improved in regard to the experimental paradigm and questionnaire. Second, the interviews were hoped to lead to further insights regarding the user implications of personalisation and personification.

Two users were allocated to each of the four conditions and they were asked to accomplish each of the two sessions in the presence of the experimenter. A think-aloud-protocol was utilised while the participants were doing the tasks and filling in the

questionnaires. After completing the sessions, the participants were also prompted about their feelings toward personalisation and personification. The questionnaire data of these users were not included in the actual sample.

2.3 Results

Several variables were assessed and a number of analyses were performed due to the exploratory nature of the present experiment. The results section is divided into nine separate subsections: participant details, session times, perceived session times, perceived session times over actual session times, engagement, workload, emotions, other ratings and interview data. Note that throughout the chapter, when the complete ANOVA tables are not illustrated, these can be found in Appendix 2.

2.3.1 Participant details

Table 2.4 shows the details of the participants in each of the four conditions. It can be seen that the groups are well balanced in terms of gender and course distributions. The IT expertise index was computed by adding the scores of the participants on two separate items: Computer usage experience and web usage experience. The former varied between one and three (novice, occasional, or expert) and the latter varied between one and four (never, occasionally, weekly, or daily use). A 2-way analysis of variance was performed on the IT expertise scores, with the between factors being personalisation (present or absent) and personification (human or machine audience). No significant between groups differences were found.

	P-H	P-M	NP-H	NP-M
Gender (males/females)	7/17	6/14	8/13	7/15
Mean age	20.7	21.1	21.5	21.3
Course (Psychology/ Electronics/Other)	12/4/1	16/4/0	14/4/3	12/5/5
Mean IT expertise (SD)	5.53 (1.07)	5.50 (1.00)	5.43 (1.47)	4.95 (1.89)
Number of people in possession of an online bank account	1/17	3/20	2/21	3/22

Table 2.4. Participant details of Experiment 1.

It can be seen that only a small portion of the participants had prior experience of interacting with a real online bank account.

2.3.2 Session times

The session times were automatically recorded on a server-side database. To minimise the influence of confounding factors, it was hoped that the interaction times across the conditions would not differ from each other. Table 2.5 illustrates the mean interaction times in each condition across the two sessions.

	P-H	P-M	NP-H	NP-M	Row mean
Session 1, mins	8.6 (4.4)	9.0 (4.1)	9.0 (3.3)	9.1 (3.6)	8.9 (3.8)
Session 2, mins	7.8 (2.3)	8.2 (4.2)	8.1 (3.5)	8.7 (4.2)	8.2 (3.6)
Column mean	8.2 (2.9)	8.6 (4.2)	8.6 (3.4)	8.9 (3.9)	8.6 (3.7)

Table 2.5. Mean session times (and standard deviations) across the conditions and sessions.

A three-way split-plot analysis of variance was carried out on the session times. The within factor was session (session 1 and session 2), with the between factors being personalisation (present or absent) and personification (human or machine audience). No significant within – or between groups differences were found, though it is apparent that the second session tended to be completed slightly faster than the first one.

2.3.3 Perceived session times

In both questionnaires, participants were asked to estimate how long they had spent accomplishing the session. This question was open-ended, though all of the participants used minutes as the unit when providing the answer. The perceived session times are depicted in table 2.6.

	P-H	P-M	NP-H	NP-M	Row mean
Session 1, mins	7.4 (4.3)	8.6 (3.5)	9.5 (4.0)	9.8 (4.3)	8.9 (4.1)
Session 2, mins	10.0 (5.4)	11.6 (4.0)	10.8 (4.4)	10.9 (3.3)	10.9 (4.2)
Column mean	8.7 (4.9)	10.1 (3.8)	10.2 (4.2)	10.4 (3.8)	

Table 2.6. Mean perceived session times (and standard deviations) across the conditions and sessions.

A three-way split-plot analysis of variance was performed on the perceived session times. The within factor was session (session 1 and session 2), with the between factors being personalisation (present or absent) and personification (human or machine audience). There was a main effect of session showing that the perceived session time was longer in the second session, although it was actually shorter [$F(1,74)=21.21$, $p<.001$]. A trend for session by personalisation interaction was also found [$F(1,74)=3.79$, $p=.055$]. Examination of the means showed that during Session 1, participants that interacted with a non-personalised application tended to provide lower estimates of the session times than the participants in the personalisation present groups. During the second session, however, there was no difference between the groups' estimations. Figure 2.4 below illustrates this.

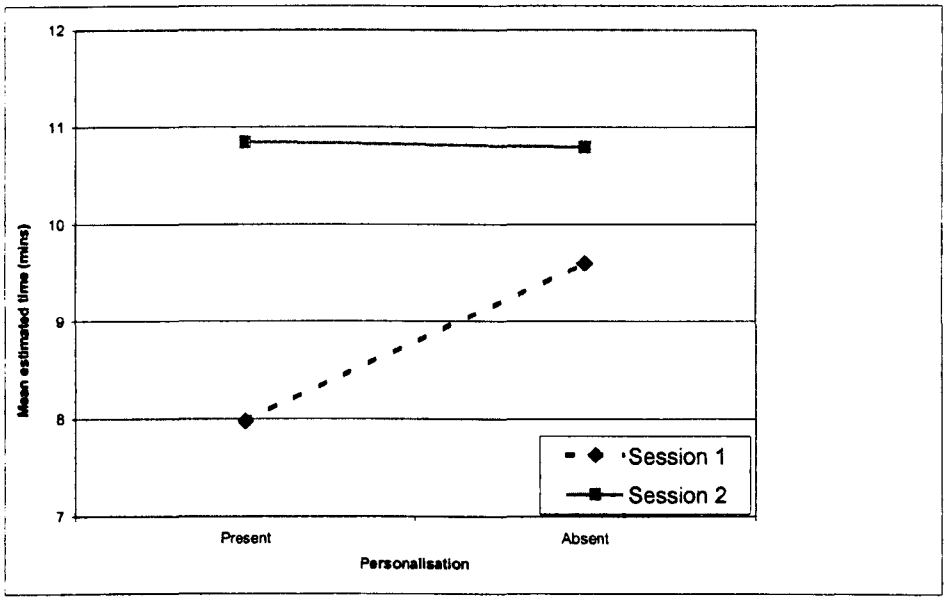


Figure 2.4. Mean estimated session times in both sessions for the groups that were interacting with a personalised site and a non-personalised application.

It is difficult to explain the main effect of session and the trend in the personalisation by session interaction. To acquire a clearer picture of the data, ratios of perceived session times over actual session times were produced.

2.3.4 Perceived session time over actual session time

As an alternative way of assessing any effect on perceived times, the ratios of perceived session times over the absolute times were computed. A ratio greater than one implies overestimation and a ratio less than one underestimation. A possible indication of personalisation being associated with greater engagement than the non-personalisation conditions may have been that the participants in the personalisation groups would have underestimated the times whereas those without personalisation would have been more accurate.

	P-H	P-M	NP-H	NP-M	Row mean
Session 1	1.0 (.6)	1.1 (.4)	1.1 (.6)	1.2 (.5)	1.1 (.5)
Session 2	1.4 (.8)	1.6 (.6)	1.5 (.5)	1.4 (.5)	1.5 (.6)
Column mean	1.2 (.7)	1.35 (.5)	1.3 (.6)	1.3 (.5)	

Table 2.7. The mean estimation ratios in each group across the sessions. A ratio greater than 1 indicates that the group members, on average, tended to overestimate the time it took for them to accomplish the session.

A three-way analysis of variance similar to the ones in sections 2.3.2 and 2.3.3 was carried out on the perceived/actual time ratios. There was a significant main effect of session indicating that the subjects overestimated the times in the second session more than for Session 1 [$F(1,67)=26.23$, $p<.001$]. The interaction apparent in the estimated times is no longer significant. For whatever reason the estimated time does not seem to be consistent with the results we hoped. Personalisation does not seem to have influenced the users' sense of the flow of time.

2.3.5. Engagement

In the engagement items, a high score is associated with a high flow experience. Table 2.8 gives the mean scores for each engagement item in each group over both sessions. The bottom row shows the composite score for each group, a score that averages across all of the seven items and the two sessions for the four conditions.

Item		P-H	P-M	NP-H	NP-M	Row mean
Concen-	Session 1	2.29 (1.05)	2.30 (.86)	2.71 (1.06)	2.55 (.96)	2.48 (.98)
tration	Session 2	2.59 (.94)	2.65 (1.31)	2.43 (1.03)	2.35 (1.1)	2.53 (1.09)
Hard to	Session 1	4.76 (.44)	4.6 (.60)	4.66 (.58)	4.50 (.96)	4.62 (.68)
concentrate	Session 2	4.47 (.80)	4.25 (.85)	4.57 (.60)	4.50 (.86)	4.45 (.78)
Self-	Session 1	4.35 (1.11)	3.65 (1.31)	4.00 (1.41)	3.82 (1.10)	3.94 (1.25)
conscious	Session 2	4.29 (.92)	3.95 (1.23)	3.81 (1.40)	4.05 (1.25)	4.01 (1.22)
Feel good	Session 1	3.59 (.80)	3.40 (1.14)	3.05 (.59)	3.41 (.73)	3.35 (.84)
	Session 2	3.47 (.72)	3.10 (1.12)	3.29 (.64)	3.32 (.89)	3.29 (.86)
Control	Session 1	4.06 (.90)	4.00 (.97)	3.86 (1.11)	3.95 (1.05)	3.96 (1.0)
	Session 2	4.24 (.83)	4.25 (.91)	4.24 (.94)	4.32 (.99)	4.26 (.91)
Lived up to	Session 1	3.94 (.90)	3.42 (1.07)	3.52 (.87)	3.95 (.95)	3.71 (.96)
expectations	Session 2	4.06 (.83)	3.50 (.69)	3.86 (.85)	4.18 (1.05)	3.90 (.89)
Success	Session 1	4.53 (.62)	4.10 (.91)	3.62 (1.12)	3.95 (.95)	4.11 (.98)
	Session 2	4.47 (.51)	4.2 (.83)	4.05 (.69)	4.18 (1.05)	4.26 (.69)
Composite		3.94 (.81)	3.67 (0.99)	3.69 (0.92)	3.80 (0.99)	3.78 (0.94)

Table 2.8. Mean engagement scores (and standard deviations) for each of the four conditions in each engagement item.

A four-way split-plot analysis of variance was carried out on the engagement scores. The four factors were: session (2 sessions), scale (7 items), personalisation (present or absent) and personification (human and machine audience). Scale is included as a within subjects independent variable to simplify the interpretation of the results. If there is no significant interaction between the scale and the IVs of interest (personalisation and personification) then it can be concluded the individual scales are affected by the IVs in similar ways and a composite 'engagement score' can reasonably be computed by averaging across the scales (bottom row in Table 2.8). A non-significant interaction also suggests that it is unnecessary to further examine the means for individual scales. The results showed no interactions between scale and personalisation, scale and personification or scale by personalisation by personification (see Table 2.9 for details).

The results did show a significant scale by session interaction [$F(1,73)=2.35$, $p<.05$]. From studying the means it can be seen that the sessions were associated with a slightly deviating effect on the perception of engagement. Session 1 mean engagement, 3.74, was lower than that of Session 2, 3.81. This is not surprising as the main emphasis of the former session was form-filling whereas the latter required the users to take part in banking tasks.

Source	F (1, 73)	p
Personalisation	< 1	n.s.
Personification	< 1	n.s.
Personalisation by Personification	4.582	.036
Scale	63.81	< .001
Scale by Personalisation	< 1	n.s.
Scale by Personification	< 1	n.s.
Scale by Personalisation by Personification	1.46	n.s.
Session	2.77	n.s.
Session by Personalisation	< 1	n.s.
Session by Personification	1.05	n.s.
Session by Personalisation by Personification	< 1	n.s.
Scale by Session	2.35	.030
Scale by Session by Personalisation	2.08	n.s.
Scale by Session by Personification	< 1	n.s.
Scale by Session by Personalisation by Personification	< 1	n.s.

Table 2.9. Results of the analysis of variance in the engagement items.

The results of the ANOVA showed no significant main effects of personalisation or personification. There was, however, a significant interaction of personalisation and personification [$F(1,73)=4.58$, $p<.05$]. Analysis of the means showed that a personalised interface was associated with a higher engagement when coupled with human image, as opposed to a machine image. To illustrate this interaction, Figure 2.5 presents the composite engagement scores in each of the four conditions.

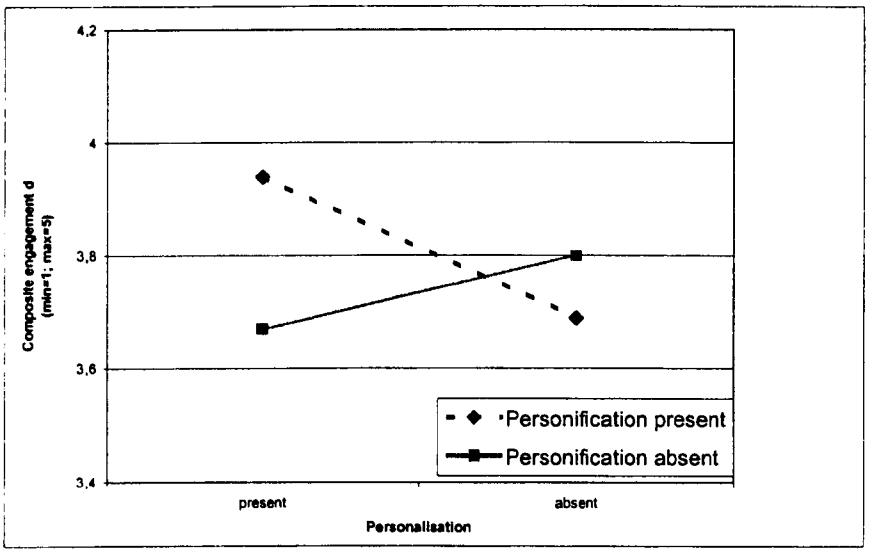


Figure 2.5. Composite engagement scores in each condition. The scores represent composite measures of the engagement items and the two sessions have been averaged. The scale varies between 1 and 5, where 5 indicates high engagement.

Results presented in Figure 2.5 showed that the engagement associated with a personalised system is higher when the interface is personified. Thus personalisation may depend on the degree of personification. This will be discussed later.

2.3.6 Workload

The mean scores for the six workload items across the four groups are illustrated in table 2.10. This scale was only assessed in Session 2. Note that a low score implies low workload, i.e., high usability. The bottom row shows the composite score for each group, i.e., an average score across the six items.

Item	P-H	P-M	NP-H	NP-M	Row mean
Mental demand	1.82 (.73)	2.3 (.98)	2.19 (.93)	2.23 (1.07)	2.15 (.94)
Physical demand	1.24 (.44)	1.35 (.49)	1.10 (.30)	1.36 (.49)	1.26 (.44)
Time pressure	1.59 (1.12)	2.1 (1.59)	2.48 (1.69)	1.55 (.96)	1.94 (1.41)
Performance	1.71 (.77)	2.30 (1.34)	2.24 (.94)	1.91 (.92)	2.05 (1.03)
Effort	1.47 (.72)	2.00 (.86)	1.86 (.79)	1.91 (.97)	1.83 (.85)
Frustration	1.71 (1.10)	1.85 (.88)	2.10 (1.14)	2.41 (1.40)	2.04 (1.16)
Composite	1.59 (.81)	1.98 (1.02)	2.00 (.97)	1.90 (.97)	1.88 (.97)

Table 2.10. The mean workload scores (and standard deviations) for each workload item in each group.

A three-way split-plot ANOVA was performed on these data (see Table 2.11). The three factors were: personalisation (present or absent), personification (human and machine audience), and scale (6 items). The results of the ANOVA were similar to the results of the engagement items in that (a) there were no significant interactions between the main IVs and the scale item and (b) personalisation and personification have a significant interaction. As is indicated by table 2.11 and figure 2.6, personalisation and personification interacted significantly [$F(1,76)=4.68$, $p<.001$]. Inspection of Figure 2.6 shows this is due to a greater effect of personalisation when personification is present.

Source	F (1, 76)	p
Personalisation	2.938	n.s.
Personification	1.697	n.s.
Personalisation by Personification	4.682	.034
Scale	8.69	.001
Scale by Personalisation	< 1	n.s.
Scale by Personification	< 1	n.s.
Scale by Personalisation by Personification	1.93	n.s.

Table 2.11. Results of the analysis of variance on personalisation and personification in the workload items.

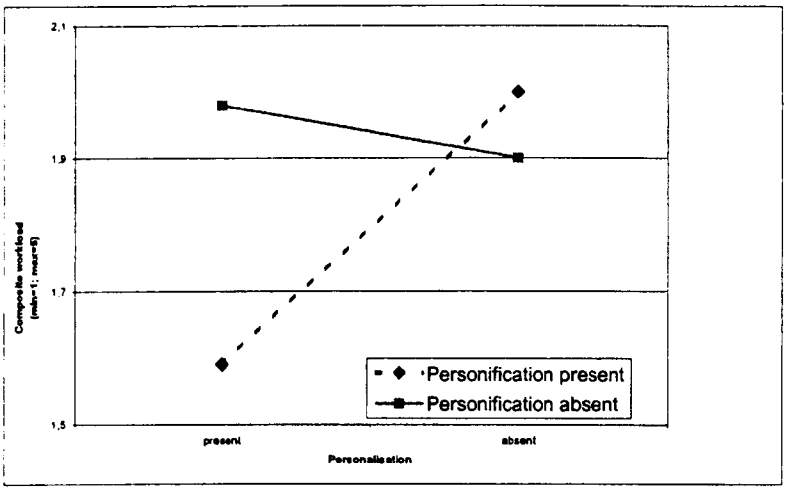


Figure 2.6. Composite workload scores in each condition.

The interaction between personalisation and personification in the IV workload is consistent with the corresponding interaction in the engagement variable. In both cases, personalisation was associated with positive effects in the personified condition.

2.3.7 Emotions

The following emotions were assessed: happiness, playfulness, cheerfulness, enjoyment, satisfaction, surprise, alertness and attachment. As the scales represent different constructs, between subjects analyses of variance, where the IVs were personalisation and personification, were run on each emotion separately. No main effects or interactions were found for any emotion scale. There seemed to be a trend for the main effect of personalisation in 'playfulness', however, with the direction being that a personalised interface is associated with greater playfulness than a non-personalised one, regardless of whether the interface if personified or not ($F(1,76)=3.31$, $p=.073$). The table below illustrates the means of the playfulness-item in each group. The scores vary between 1 and 5, with a high score indicating a strong feeling of this emotion.

P-H	P-M	NP-H	NP-M	Row mean
3.06 (1.09)	2.75 (.97)	2.52 (1.12)	2.41 (1.10)	2.66 (1.08)

Table 2.12. Means (and standard deviations) of each group in item 'playfulness'.

It was hypothesised that personalisation would be associated with greater emotional involvement than a non-personalised interface. The trend in playfulness, which is consistent with the predicted direction, gives us some reason to believe that personalisation might elicit emotional responses. However, the results suggest that in the present study no differences were created. A possible reason for the lack of effects could lie in the emotion words being randomly selected and not being representative of the spectrum of general emotional engagement.

2.3.8 Other ratings

The participants were asked six questions concerning their general impressions of the system. Table 2.13 reports the means and standard deviations on these items in each group. A high score indicates agreement with the item. The last three questions were used as manipulation checks.

Question	P-H	P-M	NP-H	NP-M	Row mean
Trustworthiness[1]	3.00 (.79)	3.05 (.78)	2.90 (.70)	3.00 (1.15)	2.99 (.87)
Image congruence[2]	2.53 (.87)	2.75 (.79)	2.71 (.46)	2.32 (.95)	2.57 (.79)
Return likelihood[3]	3.35 (1.11)	3.40 (1.31)	2.95 (1.36)	2.91 (1.23)	3.14 (1.26)
Human being[4]	2.41 (1.18)	2.55 (1.15)	2.71 (.96)	1.95 (1.17)	2.4 (1.13)
Knowledge of audience[5]	2.12 (1.11)	2.35 (1.14)	2.00 (1.05)	2.23 (1.38)	2.18 (1.17)
Tailored to needs[6]	3.47 (.87)	3.50 (1.15)	2.71 (1.06)	2.82 (1.14)	3.10 (1.11)

Table 2.13. Mean scores (and standard deviations) in the other ratings.

Two-way between subjects analyses of variance were applied on each of the items above. The two factors were personalisation and personification. The only ANOVA that produced significant effects was the control question 'Tailored to needs', which showed a significant main effect of personalisation [$F(1,76)=8.97$, $p<.05$]. This implied that when

[1] Digital Bank is trustworthy
[2] Digital Bank's image is close to my own image
[3] I would return to Digital Bank's site
[4] Indicate what you feel was the nature of the web site on the following continuum: machine _ _ _ _ _ human-being
[5] I know who I was interacting with during the session
[6] The web site was tailored to my needs

personalisation was present the participants regarded the site as being tailored to their needs to a greater extent than those for whom the site was not personalised. This indicates that personalisation was noticed by the subjects. Unfortunately, there were no significant differences between the groups in the two other manipulation checks, 'Knowledge of audience' and 'Human being'. The lack of effects in the former item could be explained by the fact that it was difficult for the participants to know whether the question referred to the experimenter or the fictional service team. Moreover, even if it was clear to them that the question referred to the service team (or lack of a service team), the bank was nevertheless fictional thus making it difficult to answer this question. The lack of between group differences in the 'Human being' item could be explained as follows: regardless of the introduction of a service team, perhaps the subjects thought of the nature of the site as referring to the system itself which is always essentially 'machine-like'. To conclude, these two manipulation checks were not worded very well and attention needs to be geared towards improving these questions in future experiments.

The other items were 'trustworthiness', 'image congruence' and 'return likelihood'. When it comes to the lack of differences in the first item, this is not so surprising as it is probably impossible to measure feelings of trust with just one question. One could expect trust to be an abstract feeling, which in turn would require the use of a multiple item scale to assess this construct. One should also note that the concept of trust is problematic in the first place when assessing it in the context of a fictional service and consequently in the presence of real risk. It was expected that the two personalisation groups would regard the site as being more congruent with their self-image than the ones where personalisation was absent because participants in the former condition were allowed to change the appearance of the main page of the site. The interviews later revealed, however, that this item was found to be somewhat obscure. The participants experienced difficulties at understanding the meaning of the question. It was also predicted that the ability to personalise would make the users want to return to the site. There were no differences between the groups in this question but this is not very alarming because return likelihood is a hypothetical construct and assessing it by observing real behaviour would have been more preferable.

2.3.9 Interview data

The eight interviews were concerned with investigating users' thoughts regarding personalisation and personification, as well as aspects that could be improved with regard to the experiment and questionnaire. Interestingly, when the interviewees were asked to comment on the personalisation technologies they had been using, the issue of this process leading to feelings of control or confidence was raised:

> "This [personalisation of the appearance of the site] gives you more confidence, you feel it's something that only you have [the interface]. You also feel free to explore the system when you've personalised it."

The possibility of using the personalisation process to increase the perception of control over the interaction process is an interesting issue. One could conceive of this effect as being of particular importance to novice users, who may be struggling with coming to grips with the system. Interestingly, one of the engagement items assessed whether the user felt she had been in control of the situation. A two-way between subjects ANOVA, with the two factors being personalisation and personification, was performed on this item to see whether there were any differences between the groups. No significant between groups differences were found indicating that personalisation did not influence the feeling of control. This does not necessarily imply, however, that control is not an issue here. As hypothesised above, perhaps the association between personalisation and control is of particular importance during novice user stage. Consequently, the sample was quite varied with regard to IT expertise reducing the potential between group differences in the perception of control.

The interviewees also mentioned the association between personalisation and trust toward the system. One of the interviewees stated that the user-initiated personalisation features made her feel that the site was "tailored to her needs" and that this contributed to the trustworthiness of the service. There was a "personal touch" associated with the site. Trust was assessed in this experiment; no between groups differences on this score were found. However, this is likely to be a complex construct and the scale could possibly become more sensitive by increasing the number of items that tap this construct.

When asked about their attitudes toward personification, three of four participants regarded the introduction of a service team as something positive, with only one user having neutral feelings about this. The interviewees noticed the presence of a team throughout the sessions and one subject commented this by stating: "there was an effort to make me feel like I was a personal customer". She specifically liked the fact that a picture of the team had been used. Interestingly, she said that this aspect could be further improved by actually providing the names and contact details of the team members. She justified this by saying that "it might have been helpful if I had really known them, if there was someone I could talk to and refer to". This comment has implications on future experiments in that it highlights the importance of bringing the service team to a more personal level.

Also general aspects related to interacting with the site were assessed. The fact that there was no feedback on the transactions of the user was commonly criticised. This was associated with, e.g. apprehension and lack of trust. Also, the 'e-shop' and 'tip of the week' links were considered to be quite simplistic indicating that one should perhaps create more complex and engaging features to the site. When prompted about the questionnaire a few subjects referred to the emotion items stating that the sessions did not really evoke any emotions in them. It may be useful therefore to revise the way the emotion items are assessed in future experiments. For instance, assessing emotional involvement with the help of a semantic differential may prove to be a more sensitive method.

2.4 Discussion

2.4.1 Main findings and design implications

Personalisation resulted in increased engagement and reduced workload in the personification present condition. This finding has direct design implications in that it highlights the potential of using personification in conjunction with personalisation in e-commerce applications. It is worth noting, however, that the interaction was not shown by any other dependent variables, including emotional involvement, trust, image congruence and return likelihood. The lack of effects in the emotion items may have been caused by

the nature of the experimental task. The participants were operating in a financial environment which is perhaps not that readily associated with emotional involvement. It would be interesting to investigate whether a different, less serious scenario would introduce the interaction that took place in the engagement and workload scales for the emotion items. Also, as discussed in section 2.3.7, the sensitivity of the emotion scales may not have been optimal. An indication of the potential relevance of emotional involvement is the trend for the main effect of personalisation in the item 'playfulness'. This suggests that an emotion scale should be included in future experiments. The reasons for the lack of effects on items trust, return likelihood and image congruence, on the other hand, were likely to have been associated with the participants not understanding the question or with the need to introduce more complex scales to assess these variables.

The interaction between personalisation and personification in the workload and engagement scales requires further investigation. A possible explanation for this interaction is that it is easier to understand and use a system exhibiting intelligent aspects, such as personalisation, when the interface is personified. Personalisation may elicit a perception of the system being intelligent – and hence human-like. Consequently, if this perception is accompanied by personification, the system becomes more natural and engaging for the user, as the two images are consistent with each other. In essence, human-like *functionality* (personalisation) may be associated with positive user implications if it is coupled with a human-like *interface* (personification). Another possible explanation for the interaction of the IVs in the workload and engagement items could be that the socially related aspects of personalisation, i.e., changing the appearance of the site, and of personification, i.e., the presence of human audience, made the users relaxed and engaged. A non-task-related dimension would have been added to the interaction process hence resulting in the conjunction of personification and personalisation producing the most optimal effects.

2.4.2 Methodological limitations, generalisability, and future research

The generalisability of the results of the experiment was influenced by the fictional nature of the service, which may have affected the participants' perceptions toward interacting with the service. The sample was also limited to university students.

Consequently, it did not accurately match the characteristics of the user population of electronic financial services.

The fictional online bank paradigm nevertheless had its advantages. For instance, it allowed effective manipulation of independent variables, one of the main requirements of running controlled experiments. The above-discussed constraints on the generalisability of the results were also not considered dangerous in the early stages of research, when the main issue is to outline the general research questions rather than to find answers to focussed problems. It was considered worthwhile to adopt the same paradigm for a follow-up study.

The current experiment shows the connection between personalisation and personification. The next step is to expand on the concept of personification. This variable had only two levels in the study: the presence of a service team versus system-like interface. One way to continue the research is to investigate the impact of an agent the user has to communicate with. The incorporation of an agent condition leads to many questions. For instance, would the interaction effect between personification and personalisation be reduced, remain or be elevated with the introduction of this third personification condition?

A few aspects should be improved with regard to the site and scale construction given that the original experimental paradigm is adopted for a future experiment. As discussed in section 2.3.7, the emotion scales should be improved to increase the sensitivity of measurement. Also, the interviews revealed that the personalisation features that were utilised should be made more complex and motivating to elevate the effect of this process.

To conclude Chapter 2, we have demonstrated that the concepts of personalisation and personification, and some of their expected effects, can be operationalised in an experiment. At least under some circumstances, the effects of personalisation on a user's subjective experience of interacting with a web site *can* depend on the degree of personification. A general design recommendation in line with this conclusion is that when constructing personalisation technologies, the particular personalisation feature may not be the only issue relevant to the success of the system. Also the way in which the information is presented may be of importance.

Chapter 3. Experiment 2: Expanding the concept of personification

3.1 Introduction

An interesting interaction effect was discovered in Experiment 1. Personalisation led to positive effects in regard to workload and engagement when the interface was coupled with personification. Experiment 2 was designed to investigate whether this effect could be replicated. There was also a novel aspect to Experiment 2. An extra condition was added to the variable personification. The idea was to intensify the notion of personification through the use of a software agent that follows the user through the service. Compared to the service team condition, the agent condition was designed to bring personification to a more personal and noticeable level. To abide to these objectives, the agent was given a distinctive character. The chosen persona was a cartoon devil possessing a 'cheeky' personality. The use of an agent with an unusual character was thought to be viable to make this condition clearly deviate from the idea of a service team. Of particular interest here was whether an intensified personification condition would increase the interaction effect observed in Experiment 1.

The use of an agent was a natural step from the point of view of existing applications incorporating personification. More often than not, personified interfaces tend to consist of embodied agents. A growing number of companies use these kinds of agents to promote their electronic services. These agents may act as assistants, guides, sales people or entertainers on the Internet (De Angeli et al., 2000). For instance, Mya is a cyber assistant designed to read Internet content to Motorola customers. One can get acquainted with her through web and TV-ads and when retrieving information from the web through a mobile phone, Mya delivers the content to the customer.

Figure 3.1 Mya, Motorola's cyber assistant, is designed to read Internet content to customers.

In addition to Motorola, companies such as Sega and Procter & Gamble also use virtual characters. Orange recently invested £100 million in a company that has developed Ananova, a 3D animated newsreader. One could argue that a new eCommerce paradigm is slowly being shaped – a paradigm that deploys life-like agents as the mediators of transactions and communications between the customer and the service provider. As De Angeli et al. (2000) phrase it, these agents are the first-generation social agents – interface software explicitly designed to set up lasting and meaningful relationships with users.

What kind of effects could the agent condition then be hypothesised to have on the IVs engagement and workload? One could conceive of the direction of the results to be similar to those associated with the team condition, with the exception that one would witness an even steeper interaction here as compared to the baseline condition incorporating a personalised system-like interface. This would be because the magnitude of personification should be greater when interacting with an agent: instead of communicating with people behind the interface, as was the case in the human-condition of Experiment 1, an agent condition makes the communication partner more explicit.

The main aims of Experiment 2 were thus to replicate the findings of Experiment 1 and expand on the notion of personification by introducing an agent condition. The fictional online bank scenario was also used in Experiment 2, although making the personalisation features of the site more complex and natural refined the methodology. For instance, an electronic bookshop was incorporated in which personalised information was delivered across two sessions. The users in the personalisation conditions were also provided with feedback on the transactions they had accomplished. The questionnaire was also improved by revising the workload, engagement and emotion scales.

The experiment incorporated a 2 by 3 between subjects design. The two independent variables were personalisation (2 levels; personalisation present, personalisation absent)

and personification (3 levels; agent image, human image, machine image). Each participant completed the experiment in one of six conditions. Table 3.1 outlines the codes that were used to refer to these conditions in this chapter.

		Personalisation	
		present	absent
Personification	Agent	P-A	NP-A
	human	P-H	NP-H
	machine	P-M	NP-M

P=Personalisation present; NP= No Personalisation ;
A=Agent image; H=Human image; M=Machine image

Table 3.1 The six conditions of Experiment 2 and their respective codes.

The following sub-sections provide an overview of the personalisation and personification features that were deployed in the study. The dependent variables are also discussed.

3.1.1 Personalisation

As in Experiment 1, nine distinct personalisation features were used on the web site. In contrast to Experiment 1, however, the complexity of the personalisation features was increased so as to increase the influence of this variable. Table 3.2 shows the personalisation features that were incorporated. It also illustrates how the control condition 'personalisation absent' was implemented. The column labelled Initiation indicates whether the given personalisation feature is user-initiated or system-initiated. The right-hand column indicates the object of change (appearance, information content, interface or functionality).

	Personalisation feature		Initiation	Object of change
	Personalisation present (groups P-A, P-H, and P-M)	Personalisation absent (groups NP-A, NP-H, and NP-M)		
1	The user is asked to personalise the slogan, logo, and colour scheme of the main page.	The user goes through the same selection process but she is told that it for the sake of "future development". That is, no personalisation takes place despite the equivalent amount of interaction.	User	Appearance (main page)
2	The user is prompted to select the kinds of news she wants to be displayed on the main page.	Same as above.	User	Information (news)
3	The user pays the bills that are marked with red colour.	User has to select the urgent bills from amongst ten or so bills for payment.	System	Information (financial)
4	The system comments on the style scheme the user has selected during Session 1.	No comments on the style the user has chosen.	System	Information (personal)
5	Information on the types of shares other customers have bought is displayed to the user.	No information available on other customers' share transactions.	System	Information (financial)
6	The user is provided with a personalised travel insurance. The recommendation is based on the user's answers regarding the length and destination of the planned trip.	The user fills in the same questionnaire but the insurance scheme that is offered is not based on the details the user has submitted.	System	Information (financial)
7	In Session 2, book recommendations are made on the basis of the book the user bought during Session 1.	A non-personalised recommendation given to the users.	System	Information (commercial)
8	The transactions of the user are indicated on the main page.	No feedback available.	System	Information (financial)
9	Use of the name of the user in several contexts, e.g., "Hello, Jan".	No name used.	System	Information (personal)

Table 3.2. Personalisation features that were used to manipulate the independent variable personalisation.

Personalisation features 1, 2, 5, 6, and 9 were adopted from Experiment 1. Feature 3, in which the user pays bills that are marked as urgent, was new. Feature 4, in which the system comments on the style scheme the user has selected was also novel, and a relatively intelligent one. Feature 7, a book recommendation, was the most complex of the new features, in that it was based on the kind of book the user purchased in the previous session. Feature 8 was concerned with providing feedback on the transactions the user has done. This feature was included because a few interviewees in Experiment 1 had recommended the use of it.

3.1.2 Personification

In the agent condition, a still image of Zingo, a cheeky web site guide, appeared on most pages across the sessions. The instructions that were given in a human-like or system-like manner in the two other personification conditions were in this agent condition mediated by Zingo. The image below shows a typical example of how the communication took place.

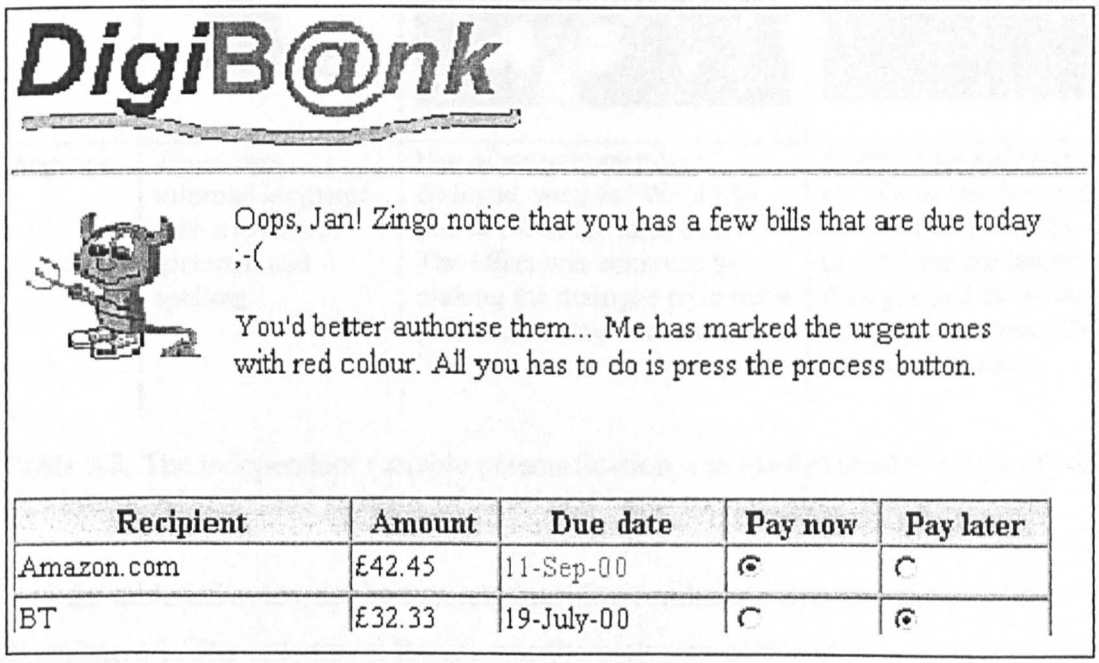


Figure 3.2. The agent – condition was achieved with the help of Zingo, a DigiBank guide with a distinctive personality.

To make the agent condition stand out from the other two levels personification and to bring personification to a personal level, Zingo was designed as a cheeky character, and the comments it made were thus of informal nature. Moreover, it made grammatical errors and the spelling associated with its comments was also deficient. See the image above for an illustration of this. Table 3.3 below illustrates in further detail how personification was controlled.

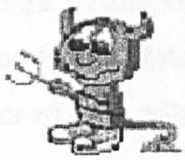
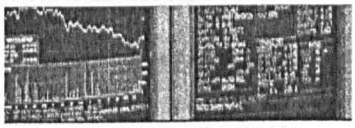
	Personification		
	Agent (groups P-A & NP-A)	Human (groups P-H & NP-H)	Machine (groups P-M & NP-M)
Communication partner	Zingo – the cheeky web site guide – introduces himself in session one and appears on the pages through the sessions.	Introduction of a service team in session one that handles the data submitted by the user.	No indications of a human presence behind the interface.
Visual items	A still, embodied agent used. 	Use of a logo containing people (during session one for P-H group and in both sessions for group NP-H): 	Use of a system-based logo: 
Language	Zingo uses informal language, with a deficient grammar and spelling.	Use of more human-like dialogue, such as "We'd like you to fill in the form below". The effect was achieved by making the dialogue style more polite and using 'we' instead of 'it'.	System-like dialogue, such as "Fill in the form below". This was achieved by minimising the length of the dialogue and by abiding to third person verbs. Also politeness absent.

Table 3.3. The independent variable personification was manipulated in terms of who the user interacted with, and in terms of the visual items and language that were used.

As the table indicates, the human and machine conditions were the same as in Experiment 1. The only novel feature was the inclusion of the agent condition.

3.1.3 Dependent variables

Minor modifications were made to the workload and engagement scales. One item was removed from the former scale and the way of assessing the awareness of the flow of time in the engagement scale was changed from an open-ended question to a five-point Likert item. See the method section for further details on these changes.

In line with the findings of Experiment 1, the emotion scales were improved for Experiment 2. Instead of assessing independent emotion items, a set of emotion *pairs* or dimensions was used to assess emotional involvement. The poles in these dimensions are emotions that are each other's antonyms either in terms of the meaning (e.g. serious versus playful) or linguistics (e.g. interested versus disinterested). The pairs were selected from a set of semantically related emotions, the so-called 'circumference of emotions', which was constructed by Plutchik (1980) using the following procedure: a list of 140 terms relating to emotional states was selected from Thesaurus as well as from various published lists of emotions. Three words – accepting, angry, and sad – were used as reference words. Six judges were then asked to rate the relative similarity of the 140 terms to each of these reference words. Consistent with the structural model of emotions (cf., Plutchik, 1980) it was then hypothesised that the emotion items would fall around the circumference of a circle in terms of their relative similarity. Thus, terms that were linguistically opposite would fall at opposite parts of the circle, with 180 degrees separating them. Similarly, words that were clearly opposite in meaning would also fall on opposite sides of the circle. 10 emotion pairs were selected from the set of 140 emotion words for the present experiment. Each emotion pair was separated by 180 degrees from each other.

A novel dependent variable in the experiment was trust. This variable was assessed because it emerged as one of the user implications of personalisation in the qualitative stage of Experiment 1. The scale consisted of six items that were developed by Laberge and Caird (1999) for an Online Financial Services Questionnaire. The reliability of this scale, as measured with Cronbach's coefficient alpha, was as high as 0.90 (significant at 0.01 level). The downside with the scale is that Laberge and Caird did not test it for validity because no suitable criterion was available. One should also note due to the fictional nature of the web site, there was no real risk associated with the interaction. Consequently, the measure of trust should in this case be treated as an *impressionistic* desirable quality rather than as an attempt to develop the concept of trust. Thus to

emphasise the distinction between real trust and trust in the context of a fictional service, the term *impressionistic trust* will be used to refer to this dependent variable.

In addition to the four main scales described above, single-item scales were also incorporated. There were five manipulation checks and the return likelihood and perceived irritation associated with interacting with the site were also assessed.

Note that both Experiments 1 and 2 only utilised subjective data. One might question why performance-based measures, such as efficiency rates concerning the use of individual personalisation features, were not assessed. Concentrating exclusively on subjective aspects of the interaction took place because the main interest of the studies was focused on the users' *perceptions* toward personalisation. Introducing performance-based variables would add an interesting dimension to the experimentation, however, and presents a viable future avenue for research on personalisation.

In summary, the aim of the present study was to determine whether the effects from Experiment 1 could be replicated using slightly improved personalisation features. The design of Experiment 2 deviated from that of Experiment 1 in that it included a third personification condition: an agent-based interface. Personification was expanded on because (1) the notion of an agent takes personification to a more personal level than the use of a team-based interface and (2) the use of social agents has become an increasingly common form of personified interfaces. Impressionistic trust toward the service was a novel dependent variable and the emotion scale was improved by basing the items on the circumference of emotions (Plutchik, 1980).

3.2 Method

3.2.1 Design

The design of Experiment 2 was similar to the one of Experiment 1, with the exception that an extra condition was added to the personification variable. Thus, a 2 by 3 design was implemented with the other independent variable being personalisation. Personalisation had two levels – present or absent. The three levels of personification, on the other hand, were agent, human and system – based interfaces. The two latter conditions were adopted from Experiment 1 and the agent condition was novel. A

between subjects – paradigm was used: subjects were allocated at random to one of the six conditions.

3.2.2 Participants

96 participants took part in the study. Their age varied between 19 and 30, with a mean age of 21.3 years. Both males and females participated and all of the subjects were students at the University of York. The subjects were acquired by sending emails to the undergraduates at psychology, electronics, biology and linguistics departments. Also posters were distributed around the campus to attract subjects. Each participant was given a monetary reward or psychology course credits for participating. See section 3.3.1 for further details on the subjects.

3.2.3 Procedure

The experiment consisted of two separate online sessions, each lasting about 10 minutes. Neither the time nor the location was controlled. In the first session the participants completed a short application form, which also included questions regarding Internet usage and expectations toward electronic banking. After completing the application form, the participants were asked to personalise their bank accounts. This included customising the types of news, the style scheme, the slogan and the logo to be displayed on the main page. Participants in the groups that did not interact with a personalised interface had to make the selections as well, with the difference being that their decisions did not affect the content and appearance of the site. This was done to provide an equivalent amount of interaction for both groups. The first session also included a short introduction into the functionality of the bank account. Finally, the participants were provided with a chance to choose a book from the electronic bookshop, as a welcome gift.

Session two was based on a scenario in which the participants had to prepare themselves for a fictional trip in the near future by purchasing travel insurance, by buying two books for the trip, by paying urgent bills and by selling shares to acquire extra cash for the trip. These functions could be accessed through the main page. The participants were

prevented from exiting the application prior to having achieved these tasks. The main page also included news links, but the participants were not required to visit these.

After each session, the participants were asked to fill in a paper questionnaire. The participants were prevented from completing the two sessions on the same day. The instructions were combined with the questionnaires into an experiment package and the subjects were also sent an email that indicated the URL for the site that included links to both sessions. It was emphasised that the participants should have the instructions in front of them while doing the sessions and that they would have to fill in the questionnaires immediately after completing each session. The experiment package is in Appendix 3.

3.2.4 Web site

As in Experiment 1, the web site was coded using Coldfusion Studio, a server-side programming language enabling the use of dynamic content. This was needed to change the interface as a function of which group the users belonged to and to enable the personalisation features. Figures 3.3 and 3.4 illustrate each page of Session 1 and 2 web sites, respectively.

Figure 3.3. Session 1 diagram, with each element representing a separate page of the site.

As the figure above indicates, after logging in to the Session 1 site, the participants were taken to the welcome page, which was used to introduce the agent or the service team. As in Experiment 1, the users were then asked to fill in an electronic application form to join Digital Bank. The next step was to personalise the main page, followed by a virtual tour on the features of account. Prior to exiting the application the participants were given the chance to select a book as a gift for becoming a member.

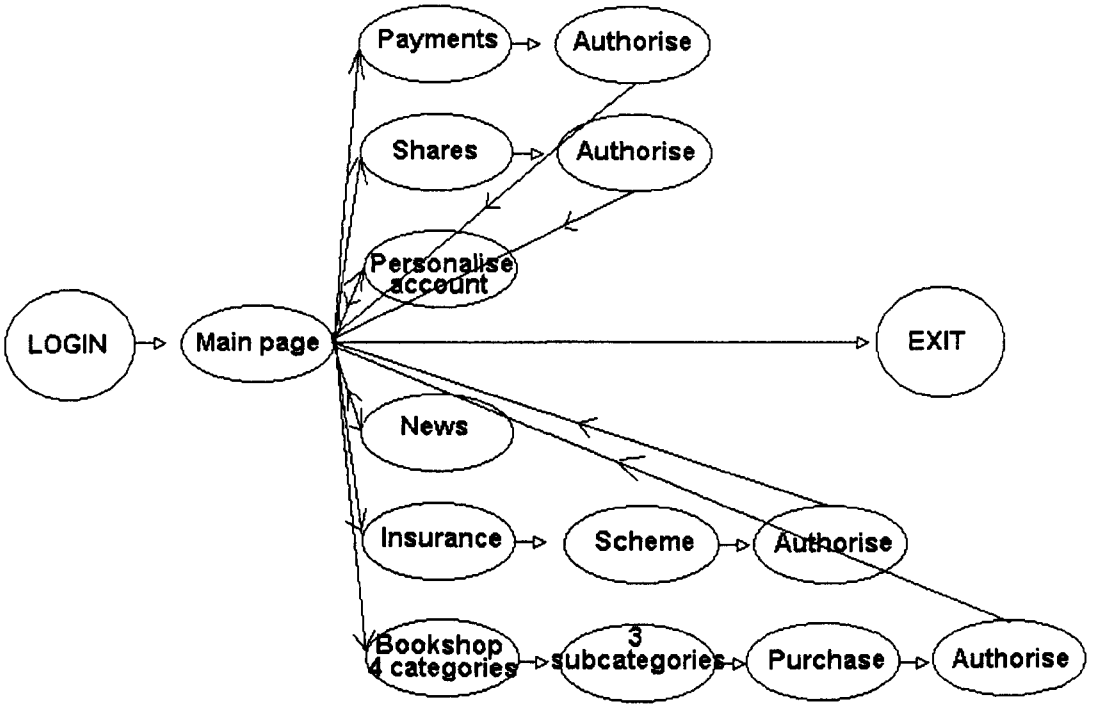


Figure 3.4. Diagram of Session 2, with each element representing a separate page of the site.

In Session 2, the participants were asked to perform the tasks described in section 3.2.3. These could be achieved in any order. The bill payment and share transaction pages each contained one drill-down page, on which the user would authorise any given transaction. The insurance transaction contained two drill-down pages. The first introduced the insurance scheme to the user and the second one required the user to authorise the insurance purchase. The bookshop was the most complex function, as it included three drill-down stages. In the first the participants selected one of three possible book subcategories. They then went on to buy the book they were interested in and prior to returning to the main page, were asked to authorise the purchase.

3.2.5 Questionnaires

The questionnaire scales can be grouped as follows: (A) engagement; (B) workload; (C) impressionistic trust; (D) emotion and (E) other items. Scales A and B were assessed after both sessions, whereas scales C - E were only assessed after Session 2. The full questionnaire is included in the experiment package in Appendix 3.

3.2.5.1 Engagement

Engagement was measured using a questionnaire that included eight flow items. These were adopted with slight modifications from Csickszentmihalyi (1987). The eight flow items that were assessed using a 5-point Likert scale were:

How well were you concentrating?
Were you succeeding at what you were doing?
Were you aware of the flow of time?
Were you in control of the situation?
How self-conscious were you?
Were you living up to your own expectations?
Was it hard to concentrate?
Did you feel good about yourself?

This scale was also used in Experiment 1, with the exception that awareness of the flow of time was now assessed using a Likert-scale item rather than by asking the participants to provide time estimates of their interaction with the site. The latter method was found insensitive as several participants provided estimates to the nearest five minutes.

3.2.5.2 Workload

The workload items were the same as in Experiment 1. However, the item 'physical demand' was omitted because it did not seem to be appropriate for assessing a task that is relatively easy, i.e., using a commerce-related web site. The items used were:

Mental Demand (i.e., how much thinking, deciding, calculating, remembering, searching, etc. did you need to do?)
Performance (i.e., how satisfied were you with your performance in achieving the goals?)
Effort (i.e., how hard did you have to work, mentally and physically, to achieve your level of performance?)

Time Pressure (i.e., do you feel you had too little time to adequately perform the experimental task?)
Frustration Level (i.e., how insecure, discouraged, irritated, stressed and annoyed did you feel during the task?)

These were assessed with a five-point Likert scale ranging from "Not at all" to "Very much".

3.2.5.3 Impressionistic trust

Laberge and Caird's (1999) five-item trust scale was used to assess the participants' impressionistic trust toward the service.

Using DigiBank's online banking is predictable.
DigiBank's online banking is NOT dependable.
DigiBank's online banking allows me to complete financial transactions accurately.
I have faith in online banking through DigiBank.
I trust DigiBank's online banking.
Using DigiBank's online banking interface to complete my financial transactions is unreliable.

Five-point Likert scale items ranging from "Strongly disagree" to "Strongly agree" were used to assess these questions.

3.2.5.4 Emotions

The pairs that were selected for the emotion questionnaire from the work of Plutchik (1980) are illustrated below. These were also assessed with a five-point Likert-scale, with the pairs representing opposite ends on each of the ten emotion scales.

Accepting versus *Suspicious*
Irritated versus *Cheerful*
Interested versus *Disinterested*
Disappointed versus *Delighted*

Bewildered versus *Self-controlled*
Dissatisfied versus *Satisfied*
Adventurous versus *Apathetic*
Intolerant versus *Tolerant*
Affectionate versus *Disaffectionate*
Serious versus *Playful*

3.2.5.5 Other items

A collection of miscellaneous items was grouped together and assessed using five-point Likert scales ranging from "Strongly disagree" to "Strongly agree". The following item was intended as a manipulation check for personalisation:

The site was tailored to my personal needs.

Similarly, for personification, there were items assessing the success of controlling for this variable:

Interacting with DigiBank was like interacting with a person.
DigiBank's did not have character.
Indicate what you feel was the nature of the web site on the following continuum:
Machine versus human-being

A few additional items that were of interest were also included:

DigiBank enabled me to do tasks that I wouldn't normally associate with an on-line bank.
I found certain features of DigiBank irritating.
I would return to DigiBank's site.
I did not feel free to explore the site.

3.3 Results

3.3.1 Participant details

The participants were all students at the University of York and they were recruited through posters and email. The participants were given a monetary reward or a psychology course credit for taking part. The table below shows the allocation of the participants to each of the six conditions.

	P-A	P-H	P-M	NP-A	NP-H	NP-M
Gender (males/females)	7/10	6/10	6/10	4/11	5/11	4/12
Mean age	21.9	22.0	20.0	20.9	21.4	21.6
IT expertise (SD)	3.39 (.53)	3.38 (.54)	3.25 (.49)	3.27 (.73)	3.42 (.55)	3.52 (.49)

Table 3.4. Participant details across the six conditions.

The IT expertise index in the bottom row of the table refers to the mean of the scores on the following items:

On average, how often do you use the computer?
How many years have you used a computer?
On average, how often do you surf the Internet?

The scores on each item ranged between one and four, where one indicates low expertise and four high expertise. A two-way analysis of variance was performed on the IT expertise scores, with the between factors being personalisation (present or absent) and personification (agent, human or machine audience). No significant between groups differences were found. Throughout this chapter where the figures of the ANOVA are not presented, consult Appendix 4 for the full ANOVA tables.

3.3.2 Session times

Session times were recorded on the server's database. Table 3.5 illustrates the mean interaction times for each group in each session.

	P-A	P-H	P-M	NP-A	NP-H	NP-M	Row mean
Session 1, minutes	7.4 (2.4)	8.3 (3.3)	7.9 (4.2)	7.8 (3.3)	8.0 (3.1)	8.6 (3.0)	7.9 (3.0)
Session 2, minutes	7.5 (2.9)	8.1 (3.1)	6.8 (3.2)	7.5 (3.1)	7.3 (4.2)	8.6 (4.6)	7.6 (3.5)
Column mean	7.5 (2.7)	8.2 (3.2)	7.4 (3.7)	7.7 (3.2)	7.7 (3.7)	8.6 (3.8)	7.8 (3.3)

Table 3.5. Mean session times (and standard deviations) in the six groups.

A three-way split-plot analysis of variance (ANOVA) was carried out on the session times. The within factor was session (session 1 and session 2), with the between factors being personalisation (present or absent) and personification (agent, human or machine audience). No significant within or between groups differences were found, though one can notice that the first session tended to be completed slightly slower than the second one.

3.3.3 Engagement

In the engagement items, a high score is associated with a high flow experience. The table below gives the mean scores for each engagement item in each group over both sessions. The bottom row shows the composite score for each group, a score that averages across all of the seven items and the two sessions for the six conditions.

Item		P-A	P-H	P-M	NP-A	NP-H	NP-M	Row mean
Concen-tration	Ses. 1	1.76 (.66)	1.88 (.81)	1.88 (.89)	1.80 (.77)	2.00 (1.03)	1.62 (.81)	1.82 (.82)
	Ses. 2	2.00 (.79)	1.94 (.68)	1.88 (.72)	2.13 (.64)	2.00 (.89)	2.06 (.85)	2.00 (.75)
Success	Ses. 1	4.47 (.62)	4.50 (.52)	4.69 (.48)	4.40 (.74)	4.56 (.51)	4.63 (.62)	4.54 (.58)
	Ses. 2	4.47 (.51)	4.25 (.86)	4.69 (.48)	4.87 (.35)	4.44 (.81)	4.38 (.62)	4.51 (.65)
Aware-ness of time	Ses. 1	3.53 (.94)	3.63 (1.02)	3.50 (1.03)	3.67 (1.29)	3.31 (1.01)	3.43 (1.23)	3.49 (1.10)
	Ses. 2	3.59 (.62)	3.81 (.98)	3.37 (.89)	3.67 (1.11)	3.69 (1.20)	3.60 (1.06)	3.59 (.95)
Control	Ses. 1	4.18 (.64)	4.31 (.79)	4.25 (.93)	3.87 (1.13)	3.94 (.93)	3.88 (.89)	4.07 (.89)
	Ses. 2	4.41 (.71)	4.38 (.81)	4.31 (.87)	3.13 (.92)	4.31 (.79)	4.25 (.68)	4.30 (.78)
Self-conscious	Ses. 1	4.18 (1.19)	3.56 (1.15)	3.88 (1.36)	3.93 (1.10)	3.88 (1.26)	3.94 (1.12)	3.90 (1.18)
	Ses. 2	4.29 (.99)	3.63 (1.20)	4.06 (1.18)	4.20 (1.01)	3.75 (1.44)	3.75 (1.34)	3.95 (1.20)
Lived up to expec-tations	Ses. 1	4.00 (.71)	3.69 (.79)	4.00 (.93)	4.00 (.76)	3.81 (.91)	3.69 (1.08)	3.86 (.86)
	Ses. 2	4.06 (.66)	3.75 (.58)	4.00 (.73)	3.73 (.88)	3.69 (.87)	4.00 (.97)	3.88 (.78)
Hard to concen-trate	Ses. 1	4.65 (.61)	4.47 (.83)	4.75 (.45)	4.60 (.51)	4.47 (.92)	4.12 (1.09)	4.51 (.77)
	Ses. 2	4.24 (.66)	4.06 (1.06)	4.13 (1.15)	4.00 (1.13)	4.50 (.97)	4.13 (1.02)	4.18 (.99)
Feel good	Ses. 1	3.76 (.83)	3.50 (.63)	3.56 (.81)	3.27 (1.03)	3.19 (.98)	3.31 (.79)	3.44 (.86)
	Ses. 2	3.76 (.56)	3.38 (.81)	3.44 (.96)	3.36 (1.01)	3.19 (.98)	3.56 (.89)	3.45 (.87)
Composite		3.83 (.73)	3.66 (.85)	3.75 (.87)	3.73 (.90)	3.70 (.91)	3.63 (.87)	3.72 (.88)

Table 3.6. Mean engagement scores (and standard deviations) for each of the four conditions in each engagement item.

A four-way split-plot analysis of variance was carried out on the engagement scores. The four factors were: session (2 sessions), scale (8 items), personalisation (present or absent) and personification (agent, human or machine image). Scale is included as a within subjects independent variable to simplify the interpretation of the results. If there is no significant interaction between the scale and the IVs of interest (personalisation and personification) then it can be concluded the individual scales are affected by the independent variables in similar ways and a composite engagement score can reasonably be computed by averaging across the scales (bottom row in Table 3.6). A non-significant

interaction also suggests that it is unnecessary to further examine the means for individual scales. For this analysis, there were indeed no interactions between scale and personalisation, scale and personification nor scale by personalisation by personification (see Table 3.7 for details).

In contrast to Experiment 1, there was no personalisation by personification interaction. Nor were there personalisation or personification main effects.

Source	F (1,86)	p
Personalisation	< 1	n.s.
Personification	< 1	n.s.
Personalisation by Personification	< 1	n.s.
Scale	118.61	< .001
Scale by Personalisation	< 1	n.s.
Scale by Personification	< 1	n.s.
Scale by Personalisation by Personification	< 1	n.s.
Session	< 1	n.s.
Session by Personalisation	3.22	.076
Session by Personification	< 1	n.s.
Session by Personalisation by Personification	< 1	n.s.
Scale by Session	4.19	< .001
Scale by Session by Personalisation	2.08	n.s.
Scale by Session by Personification	< 1	n.s.
Scale by Session by Personalisation by Personification	< 1	n.s.

Table 3.7. Results of the analysis of variance in the engagement items.

As personification and personalisation interacted significantly in this item in the previous experiment, a figure is shown to help determine whether any signs of such an interaction can be seen in the present results[1]. The previous experiment did not include the agent condition but of interest is whether the pattern of results in the team and the system conditions is transferred.

[1] The results in each scale will be graphically illustrated in this chapter if (a) an interaction occurred in the previous experiment for the corresponding scale or (b) if there is a significant interaction between the main independent variables.

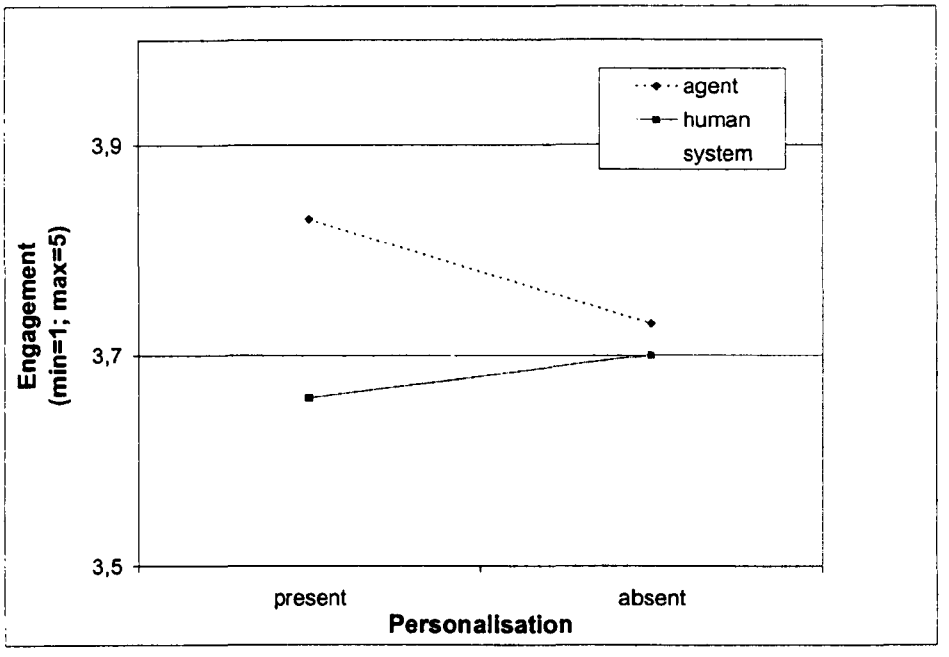


Figure 3.5. Mean scores in the engagement scale across the conditions. Here a highs score illustrates high engagement.

Figure 3.5 shows that the mean engagement scores in the team and system conditions are directionally opposite from those of the corresponding scores in Experiment 1. That is, in contrast to the previous experiment, when personalisation is present, the system condition is associated with higher engagement than the team condition.

A significant scale by session interaction was found which indicates that the effects of the sessions on the individual items on the scale were not constant. Table 3.6 indicates the inconsistency. In general, the difference in the between session item scores is less than .1 units. However, items 'control' and 'concentration' are positively affected, by .23 and .2 respectively, when moving from the first to the second session. This implies that the participants felt more in control and concentrated more in Session 2. In contrast to these positive changes, the score on item 'hard to concentrate' decreases by .33 units toward the second session, which indicates that the participants found it harder to concentrate during the second session. This interaction is not surprising. After all, it is arguable that one can have a feeling of being in control of something despite finding it hard to concentrate on the same task. Consequently, this would then also cause the scale by session interaction.

3.3.4 Workload

The mean scores across the four groups in each of the five workload items are illustrated in Table 3.8. In contrast to Experiment 1, these items were administered after both sessions. Further, the scale has one question less as compared to Experiment 1. Note that a low score implies low workload, i.e., high usability. The bottom row shows the composite score for each group, which is an average score across the five items.

Item		P-A	P-H	P-M	NP-A	NP-H	NP-M	Row mean
Mental demand	Ses. 1	2.18 (.81)	2.38 (.96)	2.38 (.96)	2.20 (.56)	2.06 (.85)	2.75 (1.00)	2.32 (.88)
	Ses. 2	2.47 (.87)	2.75 (1.06)	2.50 (1.03)	2.40 (.74)	2.69 (1.01)	2.75 (.93)	2.59 (.94)
Time pressure	Ses. 1	1.35 (.61)	1.25 (.58)	1.31 (.55)	1.06 (.25)	1.44 (.73)	1.23 (.52)	1.27 (.53)
	Ses. 2	1.35 (.61)	1.69 (.95)	1.50 (.63)	1.25 (.53)	1.44 (.63)	1.49 (.73)	1.50 (.75)
Perfor-mance	Ses. 1	1.88 (.70)	1.94 (.68)	1.75 (.77)	2.13 (.83)	2.37 (1.02)	2.19 (1.17)	1.97 (1.00)
	Ses. 2	1.53 (.51)	2.00 (.82)	1.50 (.63)	1.87 (1.06)	2.00 (1.03)	1.88 (.72)	1.69 (.69)
Effort	Ses. 1	1.76 (.75)	1.87 (.81)	1.75 (.58)	1.73 (.59)	2.00 (.82)	2.25 (.77)	2.00 (.72)
	Ses. 2	2.18 (.73)	2.38 (.96)	2.25 (.58)	2.20 (.56)	2.44 (1.21)	2.44 (1.15)	2.34 (.94)
Frustra-tion	Ses. 1	1.65 (.86)	1.38 (.62)	1.69 (1.08)	1.80 (.94)	1.88 (1.36)	1.63 (.96)	1.66 (1.00)
	Ses. 2	1.65 (.49)	1.50 (.73)	1.69 (.95)	2.20 (1.15)	1.81 (1.17)	1.62 (.50)	1.66 (.75)
Composite		1.80 (.69)	1.91 (.83)	1.83 (.82)	1.95 (.72)	1.96 (.89)	2.04 (.81)	1.91 (.82)

Table 3.8. The mean scores (and standard deviations) for each workload item in each group, through the sessions. The scale ranged between one and five, with a low score being associated with low workload.

Table 3.9. illustrates the results of the four-way split-plot ANOVA, in which the factors were: session (2 sessions), scale (8 items), personalisation (present or absent) and personification (agent, human or machine image).

Source	F (1, 90)	p
Personalisation	1.94	.167
Personification	< 1	n.s.
Personalisation by Personification	< 1	n.s.
Scale	48.32	< .001
Scale by Personalisation	1.51	n.s.
Scale by Personification	1.52	n.s.
Scale by Personalisation by Personification	1.20	n.s.
Session	8.40	.005
Session by Personalisation	< 1	n.s.
Session by Personification	1.16	n.s.
Session by Personalisation by Personification	1.25	n.s.
Scale by Session	7.87	< .001
Scale by Session by Personalisation	< 1	n.s.
Scale by Session by Personification	< 1	n.s.
Scale by Session by Personalisation by Personification	< 1	n.s.

Table 3.9. Results of the analysis of variance on personalisation and personification in the workload items.

There were no interactions between scale and personalisation, scale and personification nor scale by personalisation by personification (see Table 3.9 for details). The composite score on the bottom row of Table 3.8 can thus be taken as a reasonable reflector of workload. As in the engagement items, the results from Experiment 1 were not replicated: there was no significant personalisation by personification interaction. Figure 3.6 graphically plots the results to give an indication of whether there was consistency in the pattern of the scores of the system and team interface conditions between the previous and the current experiment, despite the nonsignificant interaction between personalisation and personification in the present experiment.

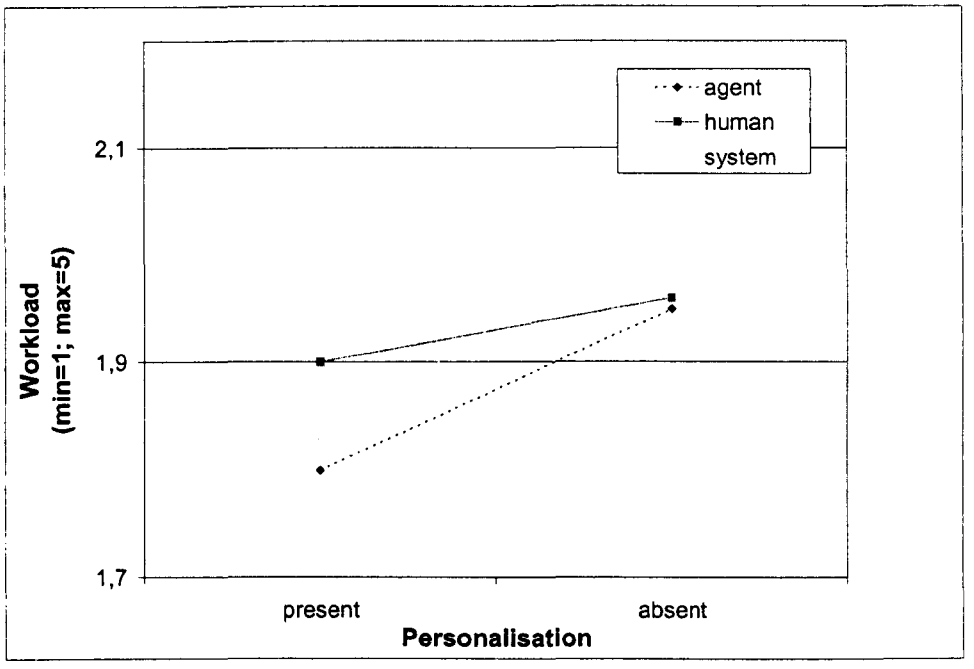


Figure 3.6. Scores in the workload scale across the conditions. The two sessions have been averaged.

The pattern of results from Experiment 1 was not repeated here. Personalisation induced slightly higher workload in the team condition compared to the system condition. The differences are non-significant, however, and directional inconsistencies can therefore be attributed to chance, both in this and in the engagement variable.

The main effect of session [$F(1,90)=8.40$, $p < .001$] indicates that the second session was perceived as more loading. There was a shift from an average of 1.84 to 1.96 from Session 1 to Session 2. What is more notable, however, is that there is a significant scale by session interaction [$F(1,90)=7.87$, $p < .001$]. As in the engagement items, this is caused by the fact that the effect of the sessions on the items were inconsistent. Consistent with the direction of the main effect of session, average scores on items 'mental demand', 'time pressure', and 'effort' increased in Session 2. However, item 'performance' decreased in session 2 by .28 units which indicates that the participants tended to be slightly more satisfied with their performance in Session 2. This interaction is natural – it is possible to be satisfied with one's performance regardless of an increased workload. Supporting this notion is the direction of the engagement items 'control' and 'concentration'. It simply seems that Session 2 was more demanding, which meant that the participants had to devote more attention to what they were doing. This increased demand in mental load could have caused the increased happiness toward one's performance, and consequently

also resulted in the increased feeling of control and concentration in the engagement items.

Removing the item 'concentration' from the workload scale leads to the scale by session interaction ceasing to be significant. This can be interpreted as statistical confirmation of the item 'concentration' having caused the interaction.

3.3.5 Emotions

A total of ten bipolar emotions were used to assess the emotional range associated with system usage. These were administered only after Session 2. The emotion scales are treated as independent constructs; no strong hypotheses are made of these. See the method section above for further details on these items. The table below shows the scores on each of these dimensions. The scale varies between 1 and 5, where low score is associated with the more negative side of the emotion dimension. For instance, a score of 2 on the suspicious versus accepting dimension would be associated with suspicion rather than acceptance.

Item	P-A	P-H	P-M	NP-A	NP-H	NP-M	Row mean
Suspicious versus Accepting	3.53 (1.12)	3.69 (1.08)	3.60 (.83)	3.13 (.99)	2.94 (1.39)	3.56 (1.26)	3.41 (1.13)
Irritated versus Cheerful	4.00 (1.06)	3.69 (.70)	3.37 (.72)	3.20 (.94)	3.38 (.89)	3.44 (.63)	3.52 (.86)
Disinterested versus Interested	3.62 (1.15)	3.94 (.57)	3.62 (.96)	3.40 (1.06)	3.69 (1.01)	3.63 (.72)	3.65 (.92)
Disappointed versus Delighted	3.59 (1.15)	3.13 (.34)	3.19 (.66)	2.87 (.83)	3.00 (.82)	3.00 (.73)	3.14 (.73)
Bewildered versus Self-controlled	4.24 (.75)	4.06 (.68)	3.81 (.75)	3.67 (.82)	4.00 (.82)	4.00 (1.03)	3.97 (.81)
Dissatisfied versus Satisfied	3.94 (.83)	3.94 (.57)	3.88 (.62)	3.20 (.94)	3.06 (1.12)	3.44 (.89)	3.58 (.90)
Apathetic versus Adventurous	3.47 (.72)	2.87 (.72)	3.19 (.66)	3.33 (.49)	3.13 (.83)	2.75 (.86)	3.13 (.75)
Intolerant versus Tolerant	3.94 (.83)	4.12 (.81)	3.56 (.63)	3.33 (.72)	3.56 (1.03)	3.50 (.63)	3.68 (.81)
Disaffectionate versus Affectionate	3.12 (.60)	3.00 (.52)	3.87 (.62)	3.80 (.86)	3.00 (.65)	3.75 (.68)	3.93 (.66)
Serious versus Playful	3.53 (1.12)	3.00 (1.10)	2.63 (.89)	3.20 (1.01)	2.56 (.81)	2.31 (.79)	2.87 (1.03)
Column mean	3.68	3.44	3.37	3.21	3.14	3.14	3.37

Table 3.10. Scores on the emotion items across the conditions.

Two-way between subjects analyses of variance were applied on each of the above items. The two factors were personalisation and personification. Table 3.11 shows the results of these tests.

Item	Source	F (1,[1])	P
Suspicious versus Accepting	Personalisation	2.88	.093
	Personification	< 1	n.s.
	Personalisation by Personification	< 1	n.s.
Irritated versus Cheerful	Personalisation	4.18	.044
	Personification	< 1	n.s.
	Personalisation by Personification	2.12	n.s.
Disinterested versus Interested	Personalisation	< 1	n.s.
	Personification	< 1	n.s.
	Personalisation by Personification	< 1	n.s.
Disappointed versus Delighted	Personalisation	5.57	.02
	Personification	< 1	n.s.
	Personalisation by Personification	1.68	n.s.
Bewildered versus Self-controlled	Personalisation	< 1	n.s.
	Personification	< 1	n.s.
	Personalisation by Personification	1.78	n.s.
Dissatisfied versus Satisfied	Personalisation	15.58	< .001
	Personification	< 1	n.s.
	Personalisation by Personification	< 1	n.s.
Apathetic versus Adventurous	Personalisation	< 1	n.s.
	Personification	3.52	.034
	Personalisation by Personification	1.83	n.s.
Intolerant versus Tolerant	Personalisation	6.52	.012
	Personification	1.3	n.s.
	Personalisation by Personification	1.18	n.s.
Disaffectionate versus Affectionate	Personalisation	1.53	n.s.
	Personification	< 1	n.s.
	Personalisation by Personification	< 1	n.s.
Serious versus Playful	Personalisation	3.34	.07
	Personification	7.09	.001
	Personalisation by Personification	< 1	n.s.

Table 3.11. Results of the two-way between subjects analyses of variance in the emotion pairs.

The table indicates that personification produced significant main effects in the scales 'apathetic versus adventurous' and 'serious versus playful'. For the former scale, the means were 3.41, 3.00 and 2.97 for the agent, team and system conditions respectively. Similarly, for the latter scale, the means were 3.37, 2.78 and 2.47. Tukey's honestly significant difference test was used to determine which of the three personification conditions deviate significantly from each other. Table 3.12 presents these results.

[1] Not all items were filled in by all of the participants. Thus, the latter degree of freedom varies as follows (starting from the first item): 89, 90, 89, 90, 90, 90, 89, 90, 89, 90.

Item	(I) Personification	(J) Personification	Mean difference (I – J)	p
Apathetic	Agent	Human	.41	.072
versus	Agent	System	.44	.046
Adventurous	Human	System	.03	n.s.
Serious	Agent	Human	.59	.041
versus	Agent	System	.91	.001
Playful	Human	System	.31	n.s.

Table 3.12. Results of the Tukey's HSD that was performed on the three levels of personification in items adventurous and playful.

The Tukey's test indicates that in the adventurous scale, the scores on the agent and system conditions are significantly different. There is also a trend for the agent and team conditions to deviate from each other. A similar pattern can be observed in the playful scale where the agent condition stands apart from both the team and the system conditions.

Personalisation, on the other hand, had a main effect in the following emotion scales: irritated versus cheerful [$F(1,90)=4.18$, $p<.05$], disappointed versus delighted [$F(1,90)=5.57$, $p<.05$], dissatisfied versus satisfied [$F(1,90)=15.58$, $p<.001$], and intolerant versus tolerant [$F(1,90)=6.52$, $p<.05$]. The means in the irritated versus cheerful scale were 3.69 and 3.34 for personalisation present and absent respectively. In the emotion pairs disappointed versus delighted, dissatisfied versus satisfied, and intolerant versus tolerant the effects of personalisation were consistent with those associated with the irritated cheerful pair – the personalisation conditions are associated with more positive emotions than the groups that do not personalise. That is, a personalised interface induces greater cheerfulness, satisfaction and tolerance than does a non-personalised interface, regardless of how personified the interface is. The means for the personalisation present versus absent conditions in these scales were as follows. Delighted-scale: 3.30 and 2.96; satisfied-scale: 3.92 and 3.23; tolerant-scale: 3.87 and 3.46.

3.3.6 Impressionistic trust

Table 3.13 includes the scores for the items that measured impressionistic trust.

Item	P-A	P-H	P-M	NP-A	NP-H	NP-M	Row mean
Predictability	3.24 (.83)	3.44 (1.15)	3.75 (1.00)	3.21 (.89)	3.50 (1.10)	3.50 (.94)	3.48 (.97)
Dependability	3.59 (.87)	3.31 (.60)	3.75 (1.00)	3.20 (1.01)	3.50 (1.03)	3.60 (.74)	3.49 (.89)
Accuracy	3.76 (.90)	3.38 (1.02)	3.81 (1.22)	3.47 (.92)	3.13 (1.54)	3.19 (.91)	3.46 (1.11)
Faith	3.35 (.93)	3.19 (1.22)	3.06 (1.18)	2.87 (1.13)	2.63 (1.31)	2.69 (1.01)	2.97 (1.14)
Trust	3.41 (.94)	3.19 (1.17)	2.94 (1.12)	2.80 (1.21)	2.50 (1.26)	2.73 (.88)	2.94 (1.12)
Reliability	3.76 (.90)	3.44 (.73)	3.69 (1.01)	3.47 (1.13)	3.13 (1.36)	3.50 (.82)	3.50 (1.01)
Composite	3.52 (.90)	3.33 (.98)	3.50 (1.09)	2.64 (1.05)	3.07 (1.27)	3.20 (.88)	3.31 (1.04)

Table 3.13. Scores (and standard deviations) in the six trust items, across the conditions.

The trust scale consists of a set of items whose internal consistency has been proven by Laberge and Caird (1999). It was therefore possible to perform a three-way split-plot analyses of variance on these scores. The between conditions were personalisation and personification, and the within conditions was scale (6 items). Table 3.14 includes the results of these computations.

Source	F (1, 87)	p
Personalisation	4.74	.032
Personification	1.25	n.s.
Personalisation by Personification	< 1	n.s.
Scale	10.19	< .001
Scale by Personalisation	1.77	n.s.
Scale by Personification	1.20	n.s.
Scale by Personalisation by Personification	< 1	n.s.

Table 3.14. Results of the three-way split-plot analysis of variance on the impressionistic trust scores.

Scale – the within factor – did not interact with either of the between groups variables. It can thus be suggested that we can reliably look at the composite trust scores. Personalisation produced a significant main effect ($F(1,87) = 4.74$, $p = .032$). The effect was such that the groups that interacted with the personalised interfaces placed a higher degree of impressionistic trust in DigiBank than the non-personalisers, with the means for the respective groups being 3.45 and 2.97.

The fact that personalisation increased impressionistic trust toward the service is interesting. In addition to personalisation, trust seems to be one of the issues in today's eCommerce market. The possibility of these two factors being correlated with each other is thus worth noting.

3.3.7 Other ratings

The following items were analysed separately:

1. *DigiBank enabled me to do tasks that I wouldn't normally associate with an on-line bank.*
2. *I found certain features of DigiBank irritating*
3. *The site was tailored to my personal needs*
4. *DigiBank's did not have character*
5. *I would return to DigiBank's site*
6. *I did not feel free to explore the site*
7. *Interacting with DigiBank was like interacting with a person*
8. *Indicate what you feel was the nature of the web site on the following continuum: machine vs. human-being*

Here items 3, 4, 7, and 8 were intended as manipulation checks. Table 3.15 shows the scores on each of the items. A high score indicates a positive attitude towards the particular item. In the last item ('machine versus human-being'), a low score implies that the site was conceived of as being machine-like.

Item	P-A	P-H	P-M	NP-A	NP-H	NP-M	Row mean
1. Enable	3.71 (.92)	4.19 (.83)	3.88 (1.09)	3.73 (1.10)	3.75 (1.18)	3.60 (1.24)	3.81 (1.05)
2. Irritating	2.76 (1.25)	2.19 (.91)	2.75 (1.13)	3.27 (1.22)	2.69 (1.54)	2.94 (1.12)	2.76 (1.22)
3. Tailored	3.41 (.94)	3.44 (.81)	3.13 (1.02)	2.87 (.92)	2.56 (.96)	2.88 (1.20)	3.05 (1.01)
4. Character	4.35 (.70)	3.38 (1.15)	3.31 (1.14)	3.67 (.72)	3.25 (1.34)	2.75 (1.06)	3.46 (1.13)
5. Return Likelihood	3.29 (.99)	3.331 (.95)	2.80 (1.15)	3.13 (1.19)	2.75 (1.57)	2.87 (1.28)	3.01 (1.16)
6. Free to explore	4.18 (.88)	4.06 (.85)	4.13 (.81)	3.80 (1.21)	4.25 (.93)	4.13 (.62)	4.09 (.88)
7. Interacting with person	2.82 (1.29)	1.81 (.91)	1.73 (1.16)	2.40 (1.24)	1.87 (.96)	2.19 (1.22)	2.15 (1.18)
8. Machine vs human-being	3.06 (.97)	2.38 (1.26)	2.37 (1.09)	2.47 (.99)	1.93 (.70)	1.73 (.70)	2.34 (1.04)

Table 3.15. Scores (and standard deviations) on the individual items that were not part of a larger scale. The score varies between 1 and 5.

Two-way between subjects analyses of variance were performed on each of the questions listed in Table 3.15, with personalisation and personification constituting the factors. Table 3.16 illustrates the results of these procedures.

Item	Source	F (1, [1])	p
1. Enable	Personalisation	1.09	n.s.
	Personification	< 1	n.s.
	Personalisation by Personification	< 1	n.s.
2. Irritating	Personalisation	2.57	n.s.
	Personification	1.92	n.s.
	Personalisation by Personification	< 1	n.s.
3. Tailored	Personalisation	7.66	.007
	Personification	< 1	n.s.
	Personalisation by Personification	< 1	n.s.
4. Character	Personalisation	4.60	.035
	Personification	7.41	.001
	Personalisation by Personification	< 1	n.s.
5. Return Likelihood	Personalisation	1.16	n.s.
	Personification	1.12	n.s.
	Personalisation by Personification	< 1	n.s.
6. Free to explore	Personalisation	< 1	n.s.
	Personification	< 1	n.s.
	Personalisation by Personification	< 1	n.s.
7. Interacting with person	Personalisation	< 1	n.s.
	Personification	4.20	.018
	Personalisation by Personification	1.17	n.s.
8. Machine vs human-being	Personalisation	7.66	.007
	Personification	4.86	.010
	Personalisation by Personification	< 1	n.s.

Table 3.16. Results of the two-way split-plot analyses of variance in the miscellaneous questions.

Personalisation had a significant main effect on item 'tailored' [$F(1,90)=7.66$, $p<.05$]. The mean scores for this item were 3.33 and 2.77 for the personalisation present and absent respectively. This was one of the control questions and shows that personalisation did seem to have an effect: the participants in the personalisation groups perceived the site as being more tailored to their needs than did the ones in the non-personalisation conditions.

[1] Note that the degrees of freedom varies from item to item as, in some of the questions, not all participants filled in the item. It is 90 in most of these questions, except for questions 1, 5, and 7 where it is 89 and the last question where it is 88.

As can be seen, there was a significant effect of personification on items 4 [$F(1,90)=7.41$. $p<.05$], 7 [$F(1,89)=4.20$, $p<.05$] and 8 [$F=7.86$, $p<.05$]. In item 4 (DigBank's site has character) the means were 4.01, 3.31 and 3.03 for the agent, human and system conditions respectively. The corresponding means for item 7 (Interacting with person) were 2.61, 1.84 and 1.96. In item 8 (machine versus human being) the means were 2.77, 2.16 and 2.05, respectively. Tukey's HSD's were performed on these scales to determine whether the conditions were different, as shown in Table 3.17.

Item	(I) Personification	(J) Personification	Mean difference (I – J)	p
4. Character	Agent	Human	.72	.02
	Agent	System	1.00	.001
	Human	System	.28	n.s.
7. Interacting with person	Agent	Human	.78	.02
	Agent	System	.66	.063
	Human	System	-.12	n.s.
8. Machine vs human-being	Agent	Human	.62	.036
	Agent	System	.72	.013
	Human	System	.10	n.s.

Table 3.17. Results of the Tukey's HSD that was performed on the three levels of personification in items 4, 7, and 8.

The table indicates that for items 4 and 8, the scores in the agent condition differ significantly from both the human and the system conditions. For item 7, this pattern is nearly repeated as the agent condition differs significantly from the team condition. There is also a trend for the agent and system groups to differ from each other, which indicates that these two conditions were also perceived differently. This pattern is consistent with the predictions in that the agent condition seems to be associated with the most human-like perceptions.

Item 4 ('character') was also associated with a personalisation main effect [$F(1,90)=4.60$, $p<.05$]. The means for this item were 3.68 and 3.22 for the personalisation present and absent conditions respectively. In other words, the participants in the personalisation present condition perceived the site as having more character than the ones for whom the site was not personalised. It was somewhat unexpected that personalisation increased the perception of the site possessing character.

As noted above, personification had a significant main effect in item 'interacting with person'. As with the 'character' item, an unexpected finding was that the scores in the team and system conditions do not differ from each other significantly.

In addition to the personification effect, personalisation also had a significant main effect on item 'machine versus human-being', [$F(1,88)=7.66$, $p<.05$]. The means for the personalisation present and absent interfaces were 2.60 and 2.04 respectively. This finding is similar to the pattern observed in item 4 (Digibank's site has character) in that both of these scales served as manipulation checks for personification except personalisation has an effect here. The trend is such that personalisation increases the attribution of anthropomorphism to the interface. Figure 3.7 illustrates this.

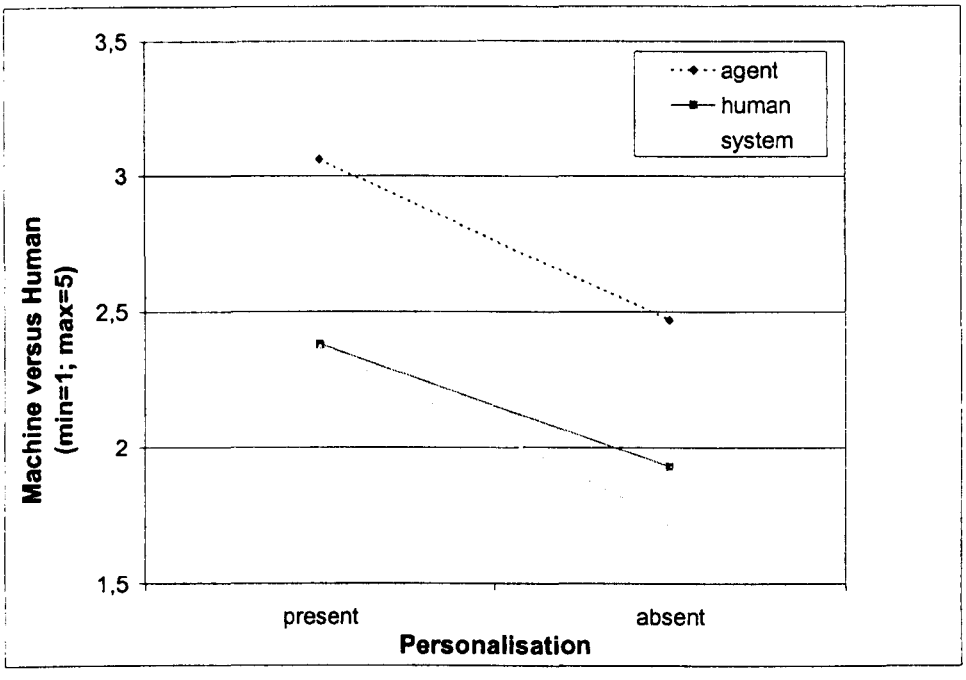


Figure 3.7. Scores across the conditions in the item 'nature of the site: machine vs human-being'. A low score is associated with machine perceptions.

3.4 Discussion and conclusions

The discussion section consists of three parts. First, the results on the scales that were assessed in both experiments are compared to each other. Second, the results of the novel scales are discussed and third, conclusions on Experiments 1 and 2 are presented and future research is discussed.

3.4.1 Experiment 1 versus Experiment 2: replication of engagement and workload

To recap on the results from Experiment 1, personalisation was associated with increased engagement and reduced workload only in the personified level. There were no signs of such an interaction in the present experiment. The independent variables personalisation and personification neither interacted with each other nor produced main effects. A possible explanation for the different results between the two experiments is that the interaction effects observed in the first study could be attributed to a type one error. The studies represent the first serious attempt to investigate the user experience associated with personalisation and they were thus rather exploratory. A large number of significance tests were performed in these studies, thus increasing the chance of the occurrence of type one error, especially for findings significant at the .05 level.

One way of overcoming this problem would be by constructing a theory of personalisation that would generate strong predictions thus reducing the number of variables investigated. A requirement for this would be to adopt a qualitative method of investigation to construct the theory and then return to the quantitative paradigm that was utilised in the two experiments to validate the theory.

3.4.2 Novel scales: emotion pairs, impressionistic trust, and other items

Personalisation was associated with a greater feeling of the site being tailored to the needs of the user as compared to the non-personalised conditions. This finding is positive in terms of succeeding to control for the independent variable personalisation. In contrast to Experiment 1, the three items that were designed to assess the success of manipulating personification (character, interacting with a person, and machine versus human-being) produced differences between the personified and non-personified groups in the predicted direction. The most prominent pattern here was that the agent condition differed significantly from the other two groups. However, there was a strong trend for the agent and system groups to differ from each other in the item 'interacting with a person', which

is indicative of the conditions being perceived differently by the participants. Interestingly, personalisation also produced significant main effects on two of these personification control items, 'character' and 'machine versus human being'. The participants in the personalisation condition perceived the site as possessing more character and resembling more a human-being, compared to the non-personalisers. This finding is in line with the interpretation of the personalisation by personification interaction that was discussed in the previous chapter. It suggests that there is a link between a human-like interface, (personification), and human-like functionality, (personalisation).

The main pattern of results with regard to impressionistic trust and the emotion pairs is that personalisation produced positive effects on both of these. Personalisation was found to increase the feeling of impressionistic trust towards the service. For the emotions that were assessed, personalisation also increased the emotional involvement toward the interaction process. The presence of personalisation was associated with increased cheerfulness, delightedness, satisfaction, and tolerance. There was also a trend for the feeling of playfulness to be higher among the users that interacted with a personalised application. A factor that indicates reliability of these findings is that the main effects of personalisation in these items had a consistent direction: personalisation was always associated with the more positive end of the dimension. This pattern is positive from the designer's point of view as it advocates the use of personalisation in eCommerce applications, with trust in the service being a particularly desirable user perception.

It would be interesting to further explore why personalisation elevated impressionistic trust and emotional involvement. One possible explanation is that personalisation is an inherently intelligent feature of the system, which in turn leads to the user attributing an intelligent and hence trustworthy image on the service provider. The emotional involvement associated with personalisation, on the other hand, may have been caused by the ability of the users in these groups to influence the appearance of the interface. The users were allowed to select playful images and total freedom was assigned to them in the choice of slogan that would be displayed at the top of the main page. The possibility of changes to the appearance of the system to have a positive emotional impact on the user is interesting from the psychological perspective and has potential for future investigation.

Finally, personification also caused significant main effects on the scores on a number of emotion pairs. A personified interface was associated with greater feelings of adventurousness and playfulness, and further examination of the scores revealed that it

was generally the agent condition that stood out from the other two conditions in this respect. This is not a surprise: Zingo was intended to be a playful character. This result could, therefore, be attributed to success in creating an emotionally colourful character.

3.4.3 General discussion

Experiment 1 allowed us to conclude that, at least under some circumstances, the effects of personalisation on a user's subjective experience of interacting with a web site *can* depend on the degree of personification. In sharp contrast, the main conclusion of Experiment 2 is that, at least under some circumstances, personalisation may induce positive effects, such as impressionistic trust and emotional involvement, regardless of the level of personification. The design implications of these two conclusions also stand in contrast to each other. Experiment 1 highlights the potential of the use of personalisation and personification in conjunction whereas Experiment 2 only speaks for the incorporation of personalisation technologies.

It was argued that the differences in the results of the experiments could be attributed to the occurrence of type one errors in the interaction effects. The interactions reported in Experiment 1 were only significant at the .05 level and the large number of significance tests that were performed further contributed to the possibility of the occurrence of type one errors. To avoid the assessment of irrelevant variables, a need would arise to produce a theory on personalisation. This could then be used to generate variables for quantitative studies thus avoiding the exploratory nature associated with the first two experiments.

There is another possible explanation for the lack of replication. The ranges of personalisation technologies that were incorporated in the two studies were not identical to each other. This would make the failure to replicate the results of Experiment 1 less significant. The lack of similarity between the results of the two studies simply allows us to conclude that there is no universal or combined effect of many personalisation features, at least on the perceptions of engagement and workload. This explanation also promotes for a change in the research paradigm. To overcome the confounding influence of the use of a wide range of personalisation features, rather than looking at the combined effects of a variety of techniques, personalisation research should focus on individual features.

A logical step consistent with the interpretation above would be to start studying personalisation features in isolation. This paradigm shift implies a change from a general

focus on personalisation to a narrower one. Simultaneously, it is possible to accommodate the interpretation regarding the type one error and adopt a qualitative approach to personalisation. The methodology used in the initial stages of the research had proved to be effective in terms of controlling for variables but what is needed at this point is research that opens up new avenues and makes room for theoretical advances. Experiments 1 and 2 have shown that personalisation can be associated with a range of user implications and qualitative research provides us with the possibility of discovering what exactly is relevant in the context of personalised user interfaces. After managing to create a theory, it is then possible to return to the quantitative method used in Part 1 of this thesis.

In summary, Experiments 1 and 2 have demonstrated that it is possible to operationalise the concepts of personalisation and personification. In Experiment 1, these two factors interacted such that a personalised and personified web site was associated with elevated engagement and reduced workload. In Experiment 2, personalisation had a positive main effect on impressionistic trust and various emotional states. The results of Experiment 1 were not replicated, however. Two suggestions were presented as to what could have caused the failure to replicate the interaction effects. According to the first explanation, the interactions apparent in Experiment 1 were attributed to type one errors. The second explanation attributed the differences in the results between the experiments to the differences in the ranges of personalisation features used in the two studies. Perhaps there is no combined effect of personalisation, but rather, personalisation features should be studied in isolation.

Part 2 and Part 3 of the thesis take into account both of the above explanations. In Part 2, a qualitative method of investigation is adopted, to produce a theory of personalisation, which is then used to generate predictions for quantitative studies in the final part of the thesis. Further, the combined effects of a range of personalisation features will not be studied but instead two personalisation features, personalisation of appearance and collaborative filtering, will be studied in isolation.

Part 2

Part 1 investigated the combined effects of a range of personalisation features. Part 2 adopts a more specific approach by qualitatively investigating collaborative filtering, i.e., personalised recommendations, and personalisation of appearance.

Part 2 presents three studies. The Two-stage study resulted in creating theories on the two personalisation features that were studied. Chapter 4 presents the method that was used in this study and describes the Theory of Personalised Recommendations. Chapter 5 is concerned with presenting the Theory of Personalised Recommendations, and Chapters 6 and 7 describe two follow-up studies, Finnish study and Home Computer study, that were performed to increase the generality of the Theory of Personalisation of Appearance.

Chapter 4. Theory of Personalised Recommendations

4.1 Introduction

The inconsistency between the results of Experiments 1 and 2 in Part 1 of the thesis could be interpreted in two ways. First, the interaction effects of Experiment 1 may be attributed to type one error, due to the large number of variables assessed. Second, it could be that there are no combined effects of personalisation, at least on the perceptions of workload and engagement, but rather, each personalisation feature is associated with its specific implications. The differences in the results between the experiments could therefore be attributed to the differences in the ranges of personalisation features utilised.

Both of these interpretations promoted a shift in the research paradigm, giving rise to Part 2 of the thesis. To accommodate the type one error interpretation, a qualitative research approach was taken in Part 2 to enable the construction of a theory, which could then be used to generate a controlled number of variables for subsequent studies. In line with the second interpretation, the focus was shifted on two personalisation features only.

The change in the research paradigm was justified also for practical reasons. There were not enough resources to create realistic system-initiated personalisation features. Continuing to experiment with the self-created personalisation features would have decreased the ecological validity of the research. Given this constraint, it was natural to start concentrating on real and professionally designed applications.

The particular personalisation features that were chosen for the focus of Part 2 were collaborative filtering and personalisation of appearance. The first represented an instance of system-initiated personalisation while the latter was a user-initiated personalisation feature. These features were chosen because they represent stereotypical personalisation technologies. Collaborative filtering is used to produced personalised recommendations for a number of contexts, including films, TV programs, and music. Personalisation of appearance, on the other hand, is a phenomenon which is increasing in popularity in the context of mobile phones and computers, in particular.

Part 2 of the thesis was involved with presenting three qualitative studies that resulted in constructing theories on the two personalisation features selected for further focus. This chapter describes a Two-stage study, in which the participants were first acquainted with

the technologies of interest (personalisation of appearance and collaborative filtering) and then a number of discussion groups were run which focussed on the user implications of interacting with these technologies. The transcripts of the discussion groups were coded and analysed using grounded theory techniques, which imply a systematic application of a set of methods to create an inductive theory (Glaser, 1992). The analysis led to the construction of a theory for the respective personalisation techniques.

As well as describing the method of Two-stage study, this chapter also presents the Theory of Personalised Recommendations. The next chapter concentrates on the Theory of Personalisation of Appearance. Chapters 6 and 7 are concerned with the follow-up studies that were performed to increase the generality of the Theory of Personalisation of Appearance.

The theories on the two personalisation features that were studied are based on the application of grounded theory analysis (GTA). A section is needed, therefore, to further discuss this methodology.

4.1.1 Grounded theory analysis

Silvonen & Keso (1999) argue that, especially since the mid-Eighties, grounded theory (GT) has become one of the most influential paradigms of qualitative research. According to Glaser (1992, p.16), the co-establisher of GT, GT refers to a

> "...general methodology of analysis linked with data collection that uses a systematically applied set of methods to create an inductive theory about a substantive area".

By definition, GT methods allow the theory to emerge from the data. Thus instead of verifying or falsifying an a priori, pre-existing model, an inductive research method is adopted: the area of interest is approached with no hypotheses, without a theory. As Glaser (1992, p. 22) states:

> "The GT researcher moves into an area of interest with no problem. He moves in with an abstract wonderment of what is going on and how it is handled."

The inductive philosophy behind GTA was thought to be particularly appropriate for the present research because the purpose was to broaden the perspective and identify as many factors as possible that might play a role when interacting with personalised user interfaces. Alternative qualitative approaches here would have included, e.g., content analysis (cf., Weber, 1990) or discourse analysis (Brown & Yule, 1983). GTA was the most viable choice here because the continuing comparison method (CCM) inherent to this methodology concentrates on finding regularities in the data thereby enabling theoretical properties to emerge from the data.

Conceptualising the data is an important feature of GT. According to the concept-indicator model (Glaser, 1978) any given concept can have many different possible empirical indicators. The indicators are interchangeable with each other as they refer to the same concept. The CCM enables one to proceed from data to theory. When using the CCM, the indicators, or incidents in the data, are compared with each other. This leads eventually to the emergence of theoretical properties in the categories. Importantly, when inferring a concept from an indicator in the data, we are abstracting, going upwards from a piece of empirical data to a more abstract concept (Punch, 1998). Punch incorporates the notion of abstraction to his description of the three coding phases associated with GTA (1998, p. 215):

> "in the first stage, open coding produces a set of first-order categories from the data, raised already to one level of abstraction. In axial coding, these categories are interconnected with each other, producing a set of propositions. In the third stage, selective coding is applied to these propositions, raising the level of abstraction again, and producing the core category, around which the theory and the data are integrated."

In addition to being associated with appropriate theoretical features, GTA was advantageous also because this methodology has previously been successfully employed when investigating user perceptions toward interacting with electronic services (cf., Riegelsberger & Sasse, 2001; Adams & Sasse, 1999).

4.1.1.1 Integrating Strauss and Corbin

The book *Discovery of Grounded Theory* (Glaser & Strauss, 1967) provided the general framework for GTA. However, several questions remained unanswered when the book was published, relating to, e.g., the research method and practical aspects of the coding process. Silvonen & Keso (1999) propose that Strauss and Corbin have later attempted to surmount these problems from two different perspectives. Strauss's approach (cf., Strauss and Corbin, 1990) has led to the construction of a detailed coding paradigm. This perspective provides an answer to the problem of the *researcher*. Glaser's coding paradigm (cf., Glaser, 1978), according to Silvonen & Keso, is more general and aims to enable the emergent properties of GT. Glaser thus emphasises the grounded nature of theory in enabling proper understanding of the *target*.

Strauss's approach (Strauss & Corbin, 1990) was used as a model for the GTA performed in the course of the thesis because it provides a more detailed description of the pragmatic, research-related aspects of the GT research process. One particular aspect of this methodology, was ignored, however, i.e., the interactionist coding paradigm, an aspect of the axial coding stage (cf., Strauss & Corbin, 1990: p. 99-107). Axial coding refers to a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories. This process enables the discovery of the causality inherent to the phenomenon being analysed. Strauss accomplishes this by utilising a coding paradigm involving "conditions", "context", "action/interactional strategies" and "consequences". Glaser argues, however, that the paradigm model involves preconception and forcing theoretical concepts on data (1992, p.63). Instead, the GT theorist simply codes for categories and properties and lets whatever conceptual relationships emerge where they may. Thus, by practising the paradigm model, according to Glaser, the analyst will always just see a condition or a consequence irrespective of relevance. We agree with Glaser: the idea of making the data fit a certain framework is not consistent with the aims of GT, where the researcher should discover rather than impose, or induce rather than deduce. A problem arises here, however: how can we discover potential causal relationships between the categories, if the paradigm model is ignored? According to Glaser (1992, p. 27), the paradigm model is not needed if the researcher possesses *theoretical sensitivity*. This refers to the researcher's knowledge, understanding and skill, which foster his generation of categories and properties and increase his ability to relate them into hypotheses, and to further integrate the hypotheses. Glaser argues that

"...there is not just one theoretical code that is a must in all cases: such as Strauss' incessant focus on conditions. The researcher must be open to the emergence of whichever of the vast array of theoretical codes fit and work the substantive codes at the time."

The following section describes how the GTA analysis was performed in the present research.

4.1.1.2 Stages of the GTA

As discussed above, the GT paradigm that was incorporated in the current study was to a great extent based on that of Strauss & Corbin (1990). The main stages of this method include open coding, axial coding, and selective coding.

In open coding, everything significant is labelled. A code is either assigned to a piece of extracted text or to the whole extract, depending on the context. During this phase, abstract conceptual categories emerge from the data that is systematically being 'broken open' by the coding process. The codes or categories at this stage are provisional and any piece of data may have several labels (Punch, 1998). The categories are more generic than the codes. They group codes and may thus include dimensions and properties, i.e., subcategories. Here properties are the general or specific characteristics or attributes of a category whereas dimensions represent the location of a property along a continuum. This notion could be illustrated by looking at an example from the present study. One of the properties that determined whether one is likely to personalise the appearance of a device was usage frequency. This property can be dimensionalised by stating that with limited usage frequency, the likelihood of personalising one's device is not very high; if the device is used often, the individual is more likely to personalise it.

In axial coding, the data are put back together in new ways, by making connections between the categories and their subcategories. Instead of operating with substantive codes, as is the case during the open coding stage, axial coding involves the use of theoretical codes. The word axial refers to the notion of this stage relating the categories identified in the open coding to each other. In the present research, throughout the open

and axial coding stages, the categories were not mutually exclusive implying that some extracts were assigned to more than one category.

In selective coding, the theory is integrated resulting in the emergence of a coherent story line, i.e., a narrative that centres around the core category identified in this last stage. The main categories are related to this central idea through explanatory statements or relationships (see Strauss and Corbin, 1990). Selective coding also involves the refining of the theory by removing excess and making sure the relationships between the categories were logical. This stage may also include the validation of the data, which can take place by, e.g., presenting the theory to the respondents for their reactions or by conducting future experiments or studies to test the framework. The latter process is described in Chapters 6 – 10, where the Theory of Personalisation of Appearance is validated and made more general.

Extensive memo writing takes place in parallel with the three coding stages. According to Glaser (1978), a memo is the theorising write-up of ideas about codes and their relationships. Moreover, Punch (1998) argues that the important thing about theoretical memos is that they help the analyst move from the empirical to the conceptual level.

4.2 Method

4.2.1 Participants

An opportunity sample of 35 participants, of whom 14 were males, was used in the study. The participants were students at the University of York, and the sample consisted of both undergraduate and postgraduate students. The age of the participants varied between 18 and 36, with the mean age being 21. To avoid awkward group dynamics, separate male and female interview groups were formed. The participants were either paid or they were awarded course credits for joining the study.

The requirements for being able to join the study were: Internet usage (other than email) at least once a week; at least one year's experience in using a computer. The extent of IT usage was verified using a short questionnaire (at the end of the Session 2). Tables 4.1 and 4.2 illustrate these frequencies.

		Once a week (%)	A few times a week (%)	Every day (%)
Computer usage	Males	0	9	91
	Females	0	44	56
Internet surfing	Males	0	18	82
	Females	29	50	21

Table 4.1. Computer usage and Internet surfing frequencies among the male and female participants.

		1 – 3 yrs (%)	3 – 5 yrs (%)	> 5 yrs (%)
Computer usage experience	Males	0	18	82
	Females	19	31	50

Table 4.2. Years of computer usage experience among the males and females.

The tables show that the participants were all relatively frequent computer users, although males used the Internet more frequently. The females also had less experience in using the computers. None of the participants were novice IT users, however.

4.2.2 Personalisation features

The users were asked to reflect on two forms of personalisation in the discussion groups: collaborative filtering and personalisation of appearance. Consult Chapter 1 for further details on these features. The site that delivered the recommendations was www.moviecritic.com. This service provided personalised film recommendations. It was operational at the time of the study but it has subsequently been closed. Moviecritic required each new user to first become a member with the service and then rate a dozen films. The system then identified a set of individuals whose profiles correlated with that of the user. The preferences of these 'like-minded' consumers were used to generate the film recommendations. The user could sort the films by genres such as in theatres, classics, romantic, or horror. The system then showed the "best bets" for the chosen genre (see Figure 4.1). Alternatively, the user could search for and select any given film and have the system predict whether the user would find the particular film enjoyable. Each film appearing on the site contained a hyperlink to a page on which the user received a prediction regarding that particular film (see Figure 4.2).

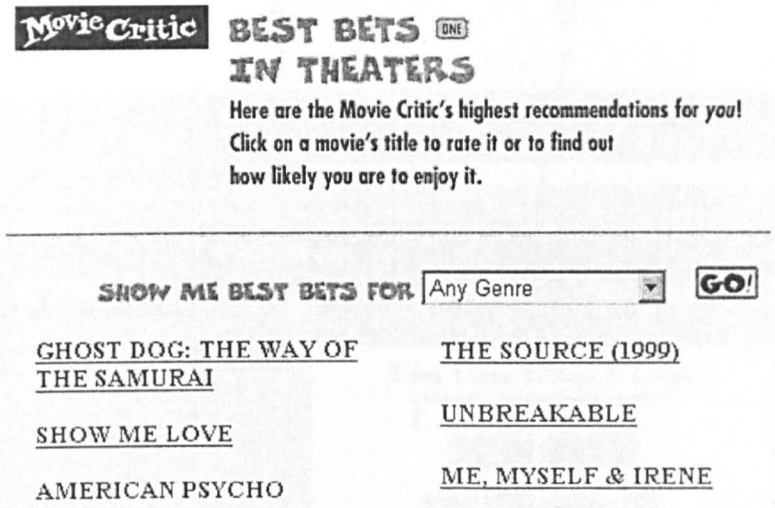


Figure 4.1. Screenshot of Moviecritic. In this particular situation, the system recommends films to the user that are currently on release and that the user is likely to enjoy.

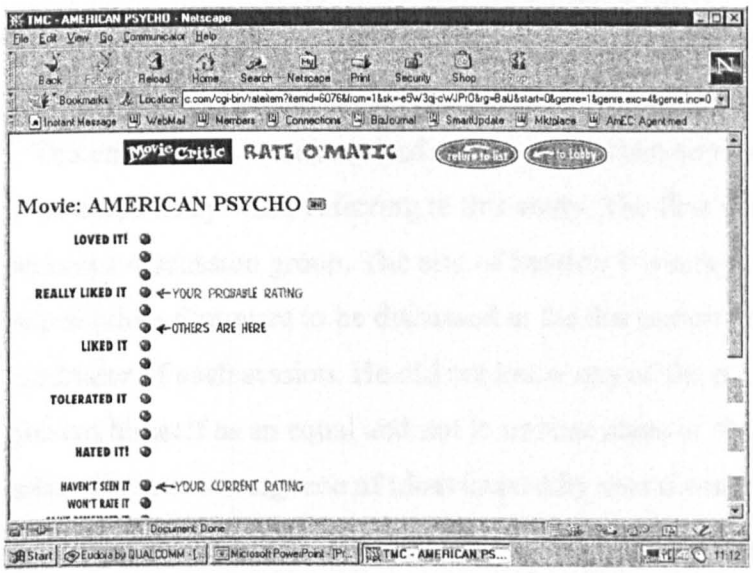


Figure 4.2. Each film that appeared on Moviecritic contained a hyperlink to a page on which a scale ranging from "Loved it" to "Hated it" was used to deliver the personalised information. A prediction of where the user's opinion would be situated on the scale was provided, as well as the average rating for the film.

Personalisation of appearance was achieved using www.excite.com, which allows the user to customise the main page by choosing graphics, welcome slogans, and colour schemes to be displayed on it. Figure 4.4 provides a screenshot of Excite.

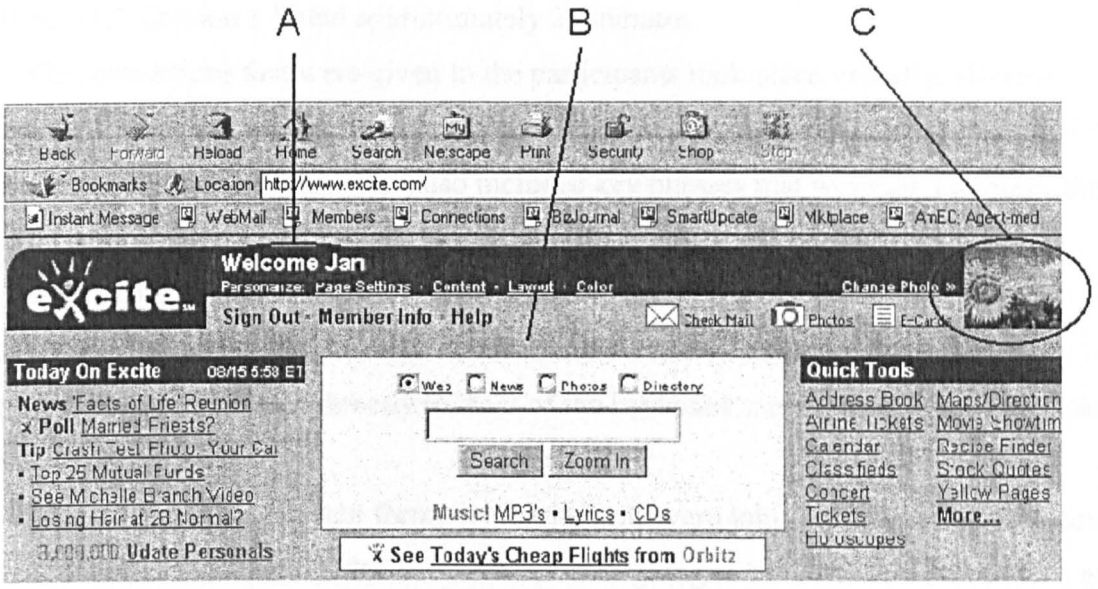


Figure 4.3. The participants were also familiarised with Excite, where one is able to choose the welcome slogan (A), colour scheme (B) and the image (C) that is displayed at the top of the page.

4.2.3 Procedure

The participants were required to take part in two separate sessions, hence the name Two-stage study when referring to this study. The first was a training session and the second a discussion group. The aim of Session 1 was to acquaint the participants with the two services that were to be discussed in the discussion groups. The author was the facilitator of each session. He did not know any of the participants and took care to present himself as an equal and not to impose ideas or conformity within the groups. To minimise the convergence of ideas caused by social conformity (Asch, 1951), individuals studying particular subjects, who may have known each other, were allocated to different groups where possible.

4.2.3.1 Session 1

The aim of Session 1 was to familiarise the participants with the two services that were to be discussed in the discussion groups. Session 1 was given on a one-to-one basis. These

sessions were held approximately five working days prior to the discussion groups, i.e., Session 2. Session 1 lasted approximately 25 minutes.

The instructions that were given to the participants took place verbally. However, to reduce variance, the experimenter had a protocol in front of him, which highlighted the stages of the session. This form also included key phrases that were used to make the instructions more consistent. Consult Appendix 5 for the protocol.

In the session the participant was asked to register with, and use each of the two services: Excite and Moviecritic. The instructor sat next to the participant. The participants were seated directly in front of the keyboard and the screen to allow them use the computer.

After filling in the consent form, the participants were told that the aim of the session was to acquaint them with the services that were going to be discussed in the focus group. Excite was always introduced first. The participants were told that Excite is a search engine and that the user can change the appearance and information content of the site. The participants were asked to fill in the electronic registration form to become members of Excite.

After filling in the membership application form, the participants were asked to select the colour, welcome phrase and picture for the new 'My Excite' portal. The following constraints were imposed to ensure that personalisation choices were as personal as possible: When choosing the colour for the site, the participants were asked to view at least three different colour choices before they were allowed to continue. The default welcome phrase was set to "Welcome <name of the participant>" and the participants had to change this. When it came to the picture displayed on the top right hand corner of the page, the participants had to visit at least three links containing twelve or more images on different themes, such as sports, travel, and art. The participants did not have to customise the information (e.g. news, horoscope, and weather forecasts) or the interface, as this would have been too time-consuming. Instead, the ability to accomplish these aspects was only described to the participants.

After using Excite, the participants were asked to click on a bookmark that took them to the start page of Moviecritic. It was explained that this recommender system uses statistical procedures to find the preferences of likeminded people whose profiles are stored in a large database. The first step in the interaction with Moviecritic involved rating twelve films the participants had previously seen. The participants were then asked to fill in a short registration form after which the experimenter described the functionality of the

site. All of the links of the main page were described and the participants were then asked to visit the 'in theatres' link, which led them to a page recommending films currently on release (see Figure 4.1).

After using each of the services, the participants were asked whether they were familiar with or used any other site that would resemble the service they had just used. None of the participants had used a recommender system previously and only one participant had personalised the appearance of a web portal such as Excite.

To make the experience of using the two personalisation features more realistic, the participants were emailed a list of films that were on general release at the time of the study. Prior to attending Session 2, the participants were asked to use Moviecritic to select a film they would like to go and see. They were also asked to use MyExcite's email functionality to see whether they had received email. Appendix 6 includes the email.

4.2.3.2 Session 2

The size of the groups in Session 2 varied between three and six participants, with the average being five. Once the participants were in the room, the facilitator introduced himself and explained that the main focus of the session was to reflect on the two web sites that the participants had been introduced to in Session 2. Everyone was encouraged to talk by asking all of the participants to introduce themselves. The questions were open-ended and were designed to gradually focus on the topic of user implications of personalisation. The initial questions were general in nature and got more specific later. Following the framework of devising focus groups (Morgan, 1997), the questions utilised the following areas: introductory, transitory, key and ending questions. A list of pre-defined open-ended questions was used to ensure that the same questions would be administered to all groups. Other questions were also allowed. Consult Appendix 7 for the full interview protocol.

Sessions lasted approximately 90 minutes. At the end of each session, the participants were rewarded. They were also encouraged to ask questions about the purpose of the study.

4.2.4 Data analysis

The analysis of the discussion groups began by transcribing the conversations from the videotapes. Videos were used as a source for the transcriptions so as to enable an association to be made between the comment and the interviewee. Grounded theory techniques were used to analyse the transcripts (see Section 4.1.1.2).

4.3 Results: Theory of personalised recommendations

What follows is a description of the issues relating to the use of Moviecritic that arose with the help of the GTA.

4.3.1 Personalised recommendations: theoretical framework

In open coding, all the utterances relevant to personalisation were labelled. This stage resulted in the identification of 39 codes relating to receiving personalised recommendations through a collaborative filtering system. In axial coding the 39 initial codes were grouped into a set of 20 categories, and connections were developed between categories and their subcategories. Seven were identified as main categories, and thirteen as subcategories. Table 4.3 lists the categories and subcategories. The first column gives the name of the category devised by the coder-analyst. The next two columns give the total number of instances of utterances instantiating this category and the number of groups (out of seven) that had at least one instantiation, respectively. The last column gives a typical example of an utterance illustrating the category. The categories printed in bold represent the main categories.

Category	Freq.	Groups (total 7)	Sample extract
Anthropo-morphism	10	5	It didn't really like me [computer]
Instinctive View	5	4	I think it's a bit uncomfortable that it's making assumptions of you...I cannot really explain it.
Categorisation	11	6	I don't like that a machine would know what I want.
Human Image	20	7	It [Moviecritic] should definitely involve an aspect of loads of people voting for something. Cause that really gives you a human touch.
Instrumental View	25	4	I think it's one person's subjective view [film reviews] but with this one...this is what most people have thought of it.
Analytic	13	4	If they had more scales they would be able to do that though [predict better]...You can have different scales, one with acting, one for the atmosphere, music, storyline.
Non-sentient	5	3	I thought oh that's really cool and then I thought: "oh hang on, I just put that info in - of course it knows what you'd like". Just suddenly remembered: "oh it's a computer. It's all doing my statistics you know".
Serious Attitude	3	3	Well it has recommendations not just for the theatres, it also has videos, so it is useful.
Trust	11	4	I thought it was quite good because it worked for me, it was pretty accurate.
No Trust	9	5	I wouldn't trust it. It wasn't rating my movies very well.
Playful Attitude	17	5	It was quite amusing to see what they thought you would like. It was quite interesting. But I don't know if I would use it.
Analogy	3	3	I don't know it's a bit like horoscope [Moviecritic]. You read it but you think: 'well how did they know I would like that film'.
Testing	25	7	I kept on testing, like putting on films and seeing whether actually like it. I did try one film, I went to see it yesterday, they said I'd like it. It was really dull.
Within variation	9	5	That's the computer kind of personalising it for you rather than you doing it yourself. And that annoys me. But when it's not something important, if it's a film, then I'm quite happy to have the computer recommend me.
Presence of Comp'y Info	25	7	Not just put whether they think you'll like it or not, but put some information to back it up.
Critical Stance	10	6	I'd probably take them into consideration [recommendations], but I don't think I'd actually go to the site and be like 'oh what movie would I like to watch?'
Knowledge of Algorithm	10	4	You need to have some sort of feeling of why it thinks you're gonna like the film, rather than just an arbitrary scale.
Incompatible Logic	21	7	When you're talking to a friend, you're not doing a statistical analysis what friends liked and didn't like. It's just a calculator doing a statistical analysis of what people have said about something.
Denial of Use of Logic	5	3	Normally I just get there and I think that looks good that looks all right I'll try it, that sort of thing. Without having a big sort of discussion of where everyone is going. I just try it.
Feeling in Control	21	6	Rather than saying no you cannot see this because it sucked. It's more like a browser of films [Moviecritic].

Table 4.3. List of the number of instances each category is present in the data. The categories printed in bold represent the main categories.

The final stage was to conduct selective coding. This is the process of integrating and refining the theory (Strauss & Corbin, 1990). The core concept, around which the opinions folded, was an individual's disposition to use personalised recommendations. Each main category had a facilitative or inhibitory outcome, or Dispositional Effect on this likelihood. The table below presents the Dispositional Effects of these.

Category	Dispositional Effect of the category
Anthropomorphism	Inhibitory
Instrumental View	Facilitative
Serious Attitude	Facilitative
Playful Attitude	Inhibitory
Presence of Complementary Information	Facilitative
Knowledge of Algorithm	Facilitative
Feeling in Control	Facilitative

Table 4.4. The outcomes of the main categories in the Theory of Personalised Recommendations either facilitate or inhibit an individual's disposition to use personalised recommendations.

To further elaborate on the notion of a Dispositional Effect, each of the seven main categories, if satisfied or present, were found to either facilitate or inhibit an individual's likelihood to use the personalisation feature. To illustrate this, a user exhibiting Anthropomorphism or with a Playful Attitude is not likely to use the RS. On the other hand, if an individual has an instrumental or serious attitude or is aware of the algorithm that is used to produce the personalised information, if complementary information is presented to the user, and if they feel in control of the interaction, then the use of the RS is facilitated. Note that the model does not postulate the Dispositional Effects of the subcategories. Rather, these should be viewed as factors that characterise or define each of the main categories.

Each of the main categories is described below. Not all of the subcategories are devoted a separate sub-section and hence where possible, the subcategories are printed in italics.

4.3.2 Anthropomorphism

The degree to which the interviewees anthropomorphised the computer and the RS varied. Those attributing human-like attributes to the system, such as the word 'know' in the extract below, possessed a negative perception toward the recommendations:

> I don't like that a machine would know what I want and what I would do.

This negative attitude toward the RS among those who anthropomorphised was sometimes even associated with a genuine fear of computers overpowering humans:

> Trusting a computer could be quite dangerous. Cos it doesn't know when to stop, cos it only thinks sort of empirically, it does not think through the ramification of what it's doing, cos it does not feel for people or have any emotion at all. Things could happen if you give them too much power.

The attitude quoted above was associated with anthropomorphism. The participant used words such as 'think' and 'know' to describe the nature of the computers. She seemed to regard the computers as sentient, human-like entities and was consequently afraid of them overpowering us.

In general, the negative attitudes toward computers tended to be somewhat more neutral than in the extract above. It was common to express a negative view but not go into detail of the reasons for thinking in that way. There was an *instinctive*, unexplainable negative attitude toward computers apparent:

> ...I don't see it as being more powerful. It's difficult to say why really, it's just kind of instinctive.

System-initiated personalisation may be associated with higher intelligence than more conventional software. This could result in a shift in one's perception of the system: instead of regarding the system as purely functional, the recommendations may elicit a more intelligent, human-like view of the system. It is consequently not surprising that the most common form of anthropomorphism that was exhibited was to regard the Moviecritic

as *categorising* the user. This was often perceived as uncomfortable. The participants said that they did not want to be told what they wanted or be completely predictable. The recommendations were perceived as patronising; one participant even mentioned that it "felt like it was taking bits out of your personality".

A possible contributor to this negative view toward being categorised by the computer is the ambivalence between two incongruous factors: intelligent functionality, i.e., personalisation, and the view of the computer as a non-sentient entity:

> It's not nice when humans categorise you. Let alone when something that doesn't even see you, doesn't have feelings, decides that it knows what you like.

That is, participants knew they were interacting with a computer, an entity less intelligent than a human being. The nature of the recommendations, on the other hand, was relatively intelligent, causing an inconsistency between the nature of the information itself (intelligent) and the physical source of the information (non-intelligent). The negative view toward the computers seemed to – for some participants – override the knowledge of the intelligent algorithm that underlied Moviecritic's recommendations. These individuals acknowledged that the algorithm used other consumers' preferences for recommending items, and that it could hence be viewed as fairly objective and human. The fact that these participants interacted with a computer was nevertheless strong enough a factor to induce this negative attitude toward the recommendations:

> I always perceive it as the computer. I realise it's a very valid point that, yeah, it's thousands of opinions. It's just always something about the computer and the human element.

Given the inconsistency between the intelligent, human-like behaviour and the less intelligent image of the system, why not change the image that the system elicits to that of a human being? This could help to alleviate the reported negative attitudes. This notion is supported by the fact that several participants said that the fact that the recommendations were based on regularities in others' film preferences made them more acceptable.

> I'm aware on both sites [Excite and Moviecritic] that no matter how much they try, it's just electrical program, very inhuman. But that's where Moviecritic has got this advantage: all these people voting, that's the human bit of it. So I'm more likely to trust that than the computer-programming bit.

It would thus seem to be important to associate an intelligent interface, such as a RS, with a *human image.* In addition to basing the recommendations on preferences of human beings, one could also introduce this human aspect by coupling the recommendations with other customers' comments and purchase behaviour. Indeed, the participants often mentioned this possibility, with Amazon.com being used to illustrate this notion.

> I bought this CD yesterday and it said that other people who have bought this have also bought this. I quite liked it.

4.3.3 Instrumental View

The participants who had adopted an instrumental view to the RS acknowledged the fact that they were dealing with a computer. This did not negatively affect their trust in the recommendations, however, and they were prepared to use the system as a means to receiving relevant information.

It was typical among the instrumental participants to recognise the algorithm on which the recommendations were based and make assertions about the utility of the operating principles. To illustrate this, one participant referred to the fact that the statistics Moviecritic used represented something in the actual world. Also, rather than projecting human-like attributes on the system, a mechanistic view of the software was incorporated:

> A computer can only do what you tell it to do. If a computer says you're dull then you must be dull. It's your fault because you provided it that info.

Essentially, these individuals viewed the system as a *non-sentient* entity. This implied that there was no need to get upset about the system making predictions of the user:

> It's only a reaction to the info that you've supplied it. It's not like actually judging you.

The recommendations were thus simply reduced to the outcomes of an algorithm performed by a non-sentient entity, thus enabling the assignment of a functional status on the recommendations.

Viewing the recommendations as originating from a non-sentient entity also leads to a situation in which one does not have to abide by social norms when interacting with the system. The interaction could thus be viewed as inconsequential:

> A computer is a computer. You give it info and it'll give you info back, there's not gonna be any consequences with that.

In addition to the theme of non-sentience, it was characteristic for an instrumental participant to adopt an *analytic* view of the system. This manifested itself in two ways. First, suggestions were made toward improving the algorithm utilised by the RS. For instance, it was often suggested that the system would become more accurate after extensive rating of films. Second, an instrumental attitude was characterised also by an explanation of what had caused an inaccurate prediction:

> I've got a feeling that's gonna take a few more users to be useful. Because the films that I rated are so similar. There's quite a broad band.

To summarise, the instrumental view implies a notion of the computer as a non-sentient entity. Hence, the interaction with the RS can be viewed as having no consequences. This enabled the assignment of a functional status to the predictions. Ultimately, the status of the information provided by the system becomes equal with that of other sources of information. In line with this functional status, these individuals do not worry about the system making assumptions of them or the system overpowering them; the absence of emotions enables an analytic and objective perspective of the Moviecritic.

4.3.4 Serious Attitude

There were participants that regarded the personalised recommendations as a valid source of information. It was admitted that the recommendations possessed the status of a potential source of information but a certain critical stance was nevertheless maintained. Rather than adopting the information without reservations, it was only regarded as one source among many others. Despite this critical attitude, these participants nevertheless regarded the RS as a potential information source. They were serious about it:

> I probably would not rely on it. I would not hold it. Because I would need more information. But I would use it. I would take it into account.

It was discovered that a mediating factor regarding trust among the participants that actually did take the recommendations seriously was the success of the system at providing accurate predictions. The users were able to determine the level of accuracy of the RS by comparing the nature of the recommendations with their own opinions. Critically, if the recommendations matched their opinions, *trust* toward the information source was increased:

> I thought it was quite good because it worked for me, it was pretty accurate.

If the recommendations were not successful, then trust would be negatively affected:

> I wouldn't trust it too much. It wasn't rating my movies very well.

The fact that trust can be mediated by the accuracy of the predictions is not very surprising. It needs to be reported, however, as it can potentially be one of the most crucial factors in determining the success of a RS.

4.3.5 Playful Attitude

In contrast to the serious participants, some participants expressed a non-serious view toward Moviecritic. The word 'playful' characterises the nature of this attitude. Rather

than utilising the predictions, a playful participant regarded the recommendations as fun or amusing.

> I suppose it depends how seriously you want to take it. It's a bit of fun, you can treat is as a bit of fun...If you start analysing it: "Oh my god, you know, I'm gonna like this film because it's really scary. What does that tell me? "... you cannot take that seriously.

Analogies were used to describe the attitudes toward Moviecritic. The following comparison characterises the relaxed attitude toward the recommendations:

> Well I won't take it seriously that site [Moviecritic]. There's one that's a death test. It has told me the exact date of my death. I found out that I will die 25th of November 2070 something. But it cannot be like accurate.

Other analogies were used as well:

> I would say it's just like in those magazines where you have questions and 'a' 'b' 'c' answers. It's ok, you read the bit it says about you or you receive like video recommendations but you sort of go: "oh yeah that would be good", and that's it. I don't think it's meant to serve any great purpose.

A third participant compared Moviecritic to reading horoscopes. Clearly these are all examples of non-serious attitudes. One can start to notice that the motivations of serious and playful individuals differ from each other. The former user group would assign the status of an information source to the recommendations whereas the latter attitude would be associated with the recommendations eliciting emotional responses in these users (cf., Blom, 2000). When it comes to trust, a serious user may be expected to place trust in the recommendations (provided they are accurate) whereas a playful user would only interact with the service for the sake of entertainment.

A theme that was often contemplated by the playful users was the process of comparing the predictions of the Moviecritic to one's own opinions regarding various films. Unlike the serious users, this was not done to determine whether it could reliably be used for accessing information. Rather, *testing* the accuracy of the predictions was found to take

place for its own sake. There was a feeling of curiosity associated with the process; curiosity in regard to the ability of the system to predict aspects of oneself. These playful participants were testing the system, just out of curiosity.

> What was interesting was that I actually went to see what it said about films that I'd actually seen. You know, tested.

It was also common to rate more films just to see if the recommendations became accurate. One participant rated more than a hundred films in his own time, just to determine this. General curiosity toward the accuracy of the RS was certainly a common motive for using the site. The following extract characterises this notion:

> I wanted to prove it wrong. When I went to the Internet I just thought: "Oh I want to prove this wrong. I want it to get it all wrong."

What causes this testing of accuracy? Why was it perceived as such an appealing process? One of the contributors to this lies within the extract above. There is a kind of scepticism toward the predictive power of the system. Further, a factor associated with this scepticism would be a need to confirm it. The scepticism could in some instances be linked to the previously discussed tendency of not accepting the computer for instinctive reasons. Another contributor could be that the process acts as a way of retrieving, integrating and re-living the emotions that were elicited by the film when it was originally seen:

> I quite enjoyed it. I thought: "I remember that film. I thought it was quite good." You know going through about 20 or 30 films [with the help of browsing Moviecritic]. Just remembered what it was like when I first saw it.

Third, the process can also be a pleasant experience simply because it is fun:

> And it's just, it's just a bit of fun to see, you know, when it does come up whether you think you would agree with it or not.

The views and attitudes described in this chapter should not be viewed as unchanging. An indicator of this is that the accuracy of the predictions was found to influence an individual's trust toward the recommendations. Another, perhaps more salient source of *within user variation* was identified among the playful users. The degree of seriousness that is adopted toward the recommendations is likely to be influenced by the importance or relevance of the area of the personalised information. Various kinds of usage contexts were named for Moviecritic. The utility of this system as an information source was perceived as relatively high in the context of renting a video or when trying to reach a joint decision about a film to be watched. In essence, the users identified situations in which the film recommendations would be relevant for them, as compared to the current status of the RS as a source of amusement. The piece of discussion below illustrates this possible shift in the attitude toward the recommendations.

- I don't trust machines to say what I like.
- But if you're in a video store?
- Yeah that's completely different obviously. I don't know but I think it would have to be the fact that I would have to make the choice there and then.

4.3.6 Presence of Complementary Information

The participants expressed a view that Moviecritic's recommendations were not enough to form a proper opinion about the recommended film. That is, there was not enough trust in the recommendations alone – there was a need to acquire complementary information about the recommended film. Additional information would here relate to access to facts about the film (e.g., the cast and the director, or watching a trailer of any given film) or access to others' comments regarding the film. It is logical to try to maximise the number of information sources when trying to make an informed decision. Even in the case of access to additional information, the recommendation would still only be attributed the status of an indicator rather than something taken for granted:

> I suppose if you don't rely on it [the recommendation], if you just use it as a kind of guide, it might give you films that you haven't really thought of yourself and then you could go and see, like read up and see what it was about and then

think whether I'd like it or not. So it's just kind of like giving you ideas really rather than going to that site and seeing that film and saying "right, I'm going to see that because it told me to".

This *critical* and reserved *stance* was found to be very common among the users. It is impossible to have heard of all the movies that are out there and are consistent with one's taste:

> When I got to actually Blockbusters or something I'm sort of overwhelmed by all these videos there. But when you give your preferences it's limiting the options for me.

Regardless of this overwhelming feeling constraining the film selection process, it was nevertheless typical to adopt a reserved attitude toward the recommendations. Users of a system such as the Moviecritic would thus bear in mind or take into consideration its recommendations. These could be used to give you an idea or acquire a second opinion. As it were, the recommendation system would be associated with the role of a browser of films. A decision to watch a film was only made, however, after consulting complementary information.

4.3.7 Knowledge of Algorithm

Many users wanted to understand the logic of the algorithm of the software that generated the recommendations. Understanding the logic behind a computer-based algorithm was perceived to be different from understanding the logic other people use:

> I'm human, I know how they think [other humans], whereas a computer I have absolutely no way of telling how they've come to that decision.

In the comment above, the participant seems to draw upon the way he infers the logic behind others' reasoning. That is, one induces others' reactions to a given stimulus by drawing on the way oneself reacts to that same stimulus. This method, however, only

applies to making inferences about other humans. In the case of computers, one cannot really tell the kind of logic that is behind the software:

> And you can tell lot of that person just by meeting for a few minutes. You cannot really with a computer.

The only way for a user to be able to know how the system works is if this is explicitly indicated by the system itself. The design implications of this are obvious – if recommendations are used, one should make sure that in addition to giving recommendations, the system should also reveal how exactly it has arrived at the given conclusions.

In addition to the general need to access the logic that is used by the RS, other themes also arose in regard to the RS algorithm. Participants often contrasted their reasoning with that of the computer. This was manifested as notions regarding the incompatibility between these two ways of reasoning and as the denial of the use of logic when making decisions.

4.3.7.1 Incompatible Logic

The participants often compared their own ways of making decisions about films to the logic the computer used to recommend films. As these processes were perceived to deviate from each other, the RS usage disposition was decreased. Quite simply, the system was often not thought to be able to capture the decision-making processes of the users. This belief implies a perception of the recommendations having to be based on human-like attributes such as emotion. In contrast, a computer is seen as doing statistical analyses or being calculative. The interviewees complained about the inability of the software to capture certain contextual factors that often influence the way a movie is selected. The fact that the mood of the user is ignored was the most common reason for not trusting the advice of a RS:

> Certainly your mood will dictate quite a lot when you're watching a film. Especially if you got choice of the cinema it depends what kind of mood you're in. If you want to go get the aggression out you might watch

something really violent and with your girlfriend you can watch something romantic.

It can be argued that the tendency for many users to emphasise the logical inconsistencies between them and the system is not fully rational. Even though the logical processes between the user and the computer deviate from each other, this does not imply that the system cannot arrive at conclusions that are relevant to the user. Collaborative filtering is based on statistical analyses that can result in reliably identifying like-minded individuals (and hence arrive at relevant recommendations). The fact that a human being does not use this technique to identify items that could be of interest does not make it less valuable as a method.

4.3.7.2 Denial of Use of Logic

It was also complained that it is not worth utilising the recommendations, as the decision to go and see a film is not a rational one in the first place.

> Normally I just get there [the cinema] and I think: "That looks good. I'll try it." Without having a big sort of discussion of where everyone is going. I just try it.

A person taking this view is likely to make the decision to see a film "on impulse" or it could be a "joint decision" thus reducing the influence of the use of logic or reasoning when making the decision. So why use Moviecritic in the first place?

4.3.8 Feeling in Control

System-initiated personalisation ultimately implies the system personalising the information. It is not surprising, therefore, that many participants expressed the feeling of the system rather than the user being in control of the personalisation process. Consistent with this, one participant suggested that he would like to change the appearance of Moviecritic to avoid the overpowering feeling that Moviecritic produces. In other words, to compensate for the lack of control regarding the personalised information, he expressed

a wish to be able to change the look of this site. The main issue here is that some users need to feel in control over the interaction with a RS:

> I'd prefer to be in control, and not the computer...it's like the machine making choices, not you, rather than you making your own decisions.

The feeling of a lack of control may stem from the fact that the system makes predictions of the user. One way of improving this would be by changing the way the information is presented. Thus, instead of telling the user, the nature of the recommendations should evoke a feeling of the system narrowing down the possibilities:

> Don't force the user into doing anything. Lots of options and suggestions rather than "you will like this product".

The recommendation feature should thus be designed such that it is signalled that the user is in control. Suggestions how to achieve this were made. For instance, the option of reading recommendations should be there, but the user should not be forced to read them, or alternatively, they would also have other ways of accomplishing the task:

> Rather have the both options [personalisation and doing it yourself]. Leave it to the computer. If that works, then ok, but if not you can just turn it off and do it yourself.

Essentially, the user should not be forced to receive the recommendations but should rather be in the position to decide whether or not to use the personalisation feature. The designer of a site should therefore aim for pull technology rather than pushing the recommendations, as the latter can elicit a perception of the computer as overpowering the user.

As can be seen in the next chapter, the issue of control was apparent also when it came to attitudes toward personalisation of appearance.

4.4 Discussion

This chapter was concerned with presenting a qualitative research method that was used to assess two individual personalisation features: personalisation of appearance and collaborative filtering, i.e., personalised recommendations. Section 4.4.1 discusses the theory that emerged in regard to personalised recommendations whereas section 4.4.2 concentrates on its design implications. Section 4.4.3 describes the limitations of the theory, discusses future research issues and aims to draw conclusions on the chapter. The methodological discussion of the grounded theory analysis appears in Chapter 7.

4.4.1 Theory of Personalised Recommendations

The analysis on the data relating to the use of Moviecritic led to a Theory of Personalised Recommendations that concentrates on describing the factors that play a role in shaping an individual's disposition to use a RS. Seven main categories emerged that were found to influence this disposition. First, some users anthropomorphised the RS and the computer in general, which in turn had a negative effect on the likelihood of using the RS. These users often regarded the system as categorising them and they were referred to as instinctive because it was often the case that they could not explain why they held such a negative attitude toward the system. A factor that was found to alleviate this negative attitude was the incorporation of a human image in the service.

Second, the Instrumental View implied that the recommendations were considered as the results of an algorithm performed by a non-sentient entity. The users thus projected a functional, non-human status on the predictions.

Third and fourth, the Attitude toward the recommendations was either Serious or Playful. Serious participants would have used the information for making decisions. Despite this seriousness, trust toward the system was only evoked if the predictions were accurate. Participants with a playful attitude, on the other hand, perceived the system as being associated with entertainment value. They would often use the service to test the ability of the system to predict their preferences. However, these individuals were not likely to use the RS for information retrieval-related purposes.

Fifth, there was a need for the Presence of Complementary Information, something additional to the recommendations. The users would bear in mind or take into

consideration the predictions. A decision to watch a film, however, would only be made after consulting other information, such as film details in the case of Moviecritic. This category, if satisfied, was found to facilitate the disposition to utilise the RS.

Sixth, Knowledge of the Algorithm that is used by the system to produce the recommendations was needed. There were two subcategories in this group that were found to negatively affect an individual's decision to use recommendations. Notions were expressed regarding the incompatibility between the reasoning of the user and system, and about the denial of the use of logic when making decisions.

Finally, there was a need to Feel in Control over the interaction with the RS. It was suggested that changing the way the information is presented would bring about a feeling of increased control. Thus instead of telling the user, the nature of the recommendations should evoke a feeling of the system narrowing down the possibilities.

4.4.2 Design implications

It is safe to assert that the aim of the producer of a RS is that the user utilises the system. The Theory of Personalised Recommendations tries to identify factors that influence the disposition to use the personalised information. It follows that the theory produces a set of explicit design implications. That is, looking at how to accommodate the categories with a Facilitative Dispositional Effect and how to avoid those with an Inhibitory Dispositional Effect produces useful design recommendations. The table below illustrates this.

Category	Design implications: Avoid the Inhibitory Effect / Promote the Facilitative Effect
Anthropomorphism	Avoid statements that make the user feel the system is categorising her. Emphasise the human element of the service by, e.g., personifying the interface.
Instrumental View	Place emphasis on the logical nature of the personalisation algorithm and on the functional nature of the service.
Serious Attitude	Promote a serious image. Create a powerful algorithm that produces accurate predictions.
Playful Attitude	Promote a serious image.
Presence of Complementary Information	Add complementary information in regard to the object of recommendation, such as objective information. .
Knowledge of Algorithm	Inform the user about how the information is produced, i.e., about the personalisation algorithm.
Feeling in Control	Dialogue style: 'narrow down' rather than 'tell'.

Table 4.5. The design implications of the theory are based on promoting the categories that have a facilitative effect and on avoiding the inhibitory categories.

The design recommendations listed in Table 4.5 are mostly based on what was discussed in the subsections devoted to each of the categories. The most common form of anthropomorphism was to complain about the system categorising them, a problem that could possibly be alleviated by placing emphasis on how the recommendations are worded. It was also found that the promotion of a human image may act as a way to alleviate the negative attitude toward the system. As suggested in the table, this human image may be promoted through the use of a personified interface. This suggestion is somewhat speculative, as it is also possible that the use of, say, an animated agent to deliver the recommendations, may lead to a lack of trust toward the system. The safe conclusion is, therefore, that personification may provide a solution to the negative attitude toward the RS, but more research is needed to find out how exactly the personification of the interface should take place.

Highlighting the logical nature of the algorithm or the functional nature of the service, on the other hand, could promote the Instrumental View. These aspects may be achieved through, e.g., an appropriate graphical design or careful wording of the recommendations.

The promotion of a serious image in the RS may accommodate the serious attitude and alleviate or avoid the Playful Attitude. Additionally, it is crucial that the recommendations are accurate. An interesting issue arises in regard to these two categories, Serious Attitude and Playful Attitude. It is not necessarily always the case that the personalised recommendations are designed to be used in a serious, information retrieval- related manner. There are surely services producing personalised information that are meant to be used in a fun-related context. For instance, Moviecritic promotes a rather leisure-based, informal image (see Figure 4.1). Perhaps this application is not meant for a serious context, but is rather designed to create an emotionally enriched user experience. This notion points toward the importance of making a distinction between fun-related and information retrieval-related RSs and of consequently incorporating deviating design principles between these contexts.

Presenting users with complementary information, such as film details in the case of Moviecritic, in regard to the object of recommendation is likely to facilitate a disposition to use the system. This recommendation is explicit and hence easy to implement. Similarly, providing the user with knowledge of how the algorithm works should be an easy feature to incorporate.

The final design recommendation is concerned with how to create a feeling of control over the personalisation process in the user. One possible solution to this problem is to carefully examine the way in which the personalised information is presented. The wording, or dialogue style, should be such that the user acquires a sense of having the final word in the process. A promising technique here would be to propose a given action or piece of information to the user, but allow the user to decide whether to accept it or not. Thus in the case of film recommendations, the user should acquire the feeling that the system is narrowing down the options for the user rather than telling what the user will or will not like. This notion leads us to the very crux of the perspective inherent to the Theory of Personalised Recommendations. The idea behind the present theory is not to look at ways to improve the algorithm, or functionality of the personalisation feature. Rather, the focus is on how to present the information, and service in general.

4.4.3 Limitations of the theory, future research suggestions and conclusions

The current theory is concerned with personalised recommendations although it was derived by investigating just one possible area of personalised recommendations, namely collaborative filtering of film information. A word of caution is thus needed here. The theory, at its present stage, characterises issues that can be relevant when interacting with a RS. It is possible, if not likely, that other issues emerge when the focus is changed to RSs that derive their recommendations from, say, observing the user's clickstream data. Future studies would also be desirable to make the theory applicable to a wider range of users and objects of recommendation, such as music or financial services.

The design recommendations discussed above lead to an idea on how to quantitatively assess the reliability of the theory, the goal of Part 3 of the thesis. A viable future experiment would be to implement the previously discussed design features on a RS and determine whether these factors influence the likelihood of using the recommendations or placing trust on them. Essentially, the degree to which the facilitative categories of the theory are satisfied could be manipulated with the help of the design recommendations produced in Table 4.5 while the usage disposition could act as the dependent variable.

It would also be interesting to determine whether the context of use (e.g., serious versus fun) and device (e.g., mobile phone versus self-service platform) interact with the independent variable 'degree of facilitative categories satisfied'. One should not view the present model as referring to individual differences in the users. It is more realistic to assume that users' opinions and beliefs are subject to changes, depending on, say, the context of use. Here we could compare using the personalisation feature as an aid in house buying to using a similar kind of RS for deciding which film to go and watch. The former would naturally be expected to be associated with a more serious attitude. These so-called external factors are not part of the theory described here. It may well be, however, that future research on the influence of, say, the context of use or the type of device used, may result in the inclusion of this aspect in the theory.

Finally, it is likely that the present model has implications for trust, which is likely to be a prerequisite for the decision to utilise recommendations. Although the data do not allow us to draw explicit conclusions regarding the associations between these two

factors, it is nevertheless feasible that these factors are linked to each other. Attempts should be made to investigate this question in the future.

In summary, this chapter has described factors that were found to influence the disposition of an individual to use the personalised recommendations produced by a system. Seven categories were listed: Anthropomorphism, Instrumental View, Serious Attitude, Playful Attitude, Presence of Complementary Information, Knowledge of Algorithm, and Feeling in Control. The factors may either facilitate or inhibit the disposition to use the RS, which consequently leads to a set of explicit design recommendations that promote the use of the personalisation feature. The theory represents the first attempt to investigate the user experience associated with personalised recommendations. It is therefore impossible to make assertions in regard to the reliability of the categories. It is safe to conclude, however, that the user has certain needs, beliefs, and attitudes toward the interaction with the personalisation feature. In addition to allocating design efforts on making the personalisation algorithm more effective, the way in which the information is presented to the user may also be crucial to the acceptability of the system.

Chapter 5. Theory of Personalisation of Appearance

5.1 Introduction

People commonly personalise places and objects in their surroundings and there is a research literature describing how people personalise their office spaces (Scheiberg, 1990; Wells, 2000), isolated environments such as polar stations (Carrere & Evans, 1994), dormitory rooms (Vinsel et al., 1980) and hospital wards (Holahan & Saegert, 1973). Information appliances are no exception in regard to this behavioural pattern. A range of products, including PCs, PDAs, mobile phones, and web portals allow the user to personalise the appearance of their graphical user interfaces. Selecting a desktop theme to a computer, ordering a logo to a mobile phone or changing the style scheme of a portal are examples of such software-based changes.

There has recently been an increase in the use of personalisation of appearance in electronic products. Each edition of Microsoft Windows has introduced new decorative features for personalising the desktop. The same trend can be observed in mobile phones. The Nokia 5110 - released in 1996 and sold with replaceable colour covers - was perhaps the first mobile providing the user with a noticeable chance to personalise it.

The most recent mobile phones include a much wider range of personalisation features. For instance, it is possible to select screen-savers, i.e., images that appear on the screen when the phone has not been used in a while. The user can also create a personalised greeting message, change the operator logo and the ringing tune, change the settings to create profiles for various usage situations, and even display personal digital images and play audio recordings. It could thus be concluded that the range and the modalities of personalisation technologies are increasing, across a number of devices. Supporting this developmental trend is the emergence of web and phone-based services that aid the user in the personalisation process. For instance, there is a wealth of web sites dedicated for downloading desktop themes, wallpapers, icons, and screensavers to one's computer. Similarly for mobile phones, ringing tones and logos can be downloaded from the Internet or ordered through telephone or SMS-based services.

In addition to the increasing trend of the manufacturers incorporating personalisation technologies, also the uptake of these features among consumers has increased in popularity. For instance in the UK, some mobile phone operators are currently enticing new customers by promising to send free mobile phone logos and tunes to subscribers. Club Nokia, in its December 2001 UK newsletter, encourages its members to use the club's web site to download Christmas-theme ringing tones, graphics and game packs, to "find your personal Christmas mood":

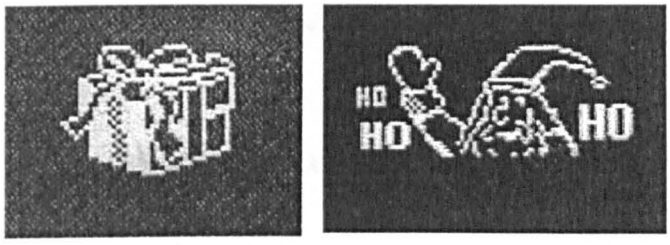


Figure 5.1. Club Nokia members are encouraged to logon to the club's web site to download Christmas-theme graphics for the mobile phone display.

Given that we accept that personalisation technologies are increasing, both in terms of range and usage of the features, it becomes important to understand the nature of the user experience associated with personalisation of appearance. What follows is a description of the Theory of Personalisation of Appearance, which arose as a result of the Two-stage study described in the previous chapter.

5.2 Method

The Two-stage study described in Chapter 4 was concerned with two personalisation features: collaborative filtering and personalisation of appearance. The method and the theory that emerged concerning personalised recommendations are described in the previous chapter. For further details on the method that was used to construct the Theory of Personalisation of Appearance, please consult section 4.2.

To summarise the method, the participants were acquainted with two personalisation features, collaborative filtering and personalisation of appearance, with the help of Moviecritic.com and Excite.com. The former site incorporates collaborative-based filtering and the latter personalisation of appearance. In the second stage of the study, the

users took part in discussion groups, in which these personalisation features were discussed. GTA was used to derive theories for the respective personalisation features.

5.3 Results – Theory of Personalisation of Appearance

With regard to personalisation of appearance, the groups were asked to compare customisation of the web site with other personalisation contexts. Mobile phones were commonly mentioned and are used as a contrasting example in this chapter.

5.3.1 Personalisation of appearance: theoretical framework

Open coding resulted in the development of 51 codes relating to personalisation of appearance. Axial coding was then performed where the codes were grouped into a smaller set of categories and connections were developed between categories and their subcategories. The 51 initial codes were reduced to a set of 34 categories. 18 of these were identified as main categories, and 16 as subcategories. Table 5.1 lists the categories with examples of the comments that exemplify them. The first column gives the name of the category devised by the coder/analyst. The categories printed in bold represent the main categories. The next two columns give the total number of instances of utterances instantiating this category and the number of groups (out of seven) that had at least one instantiation, respectively. The last column gives a typical example of an utterance illustrating the category.

Category	Freq.	Groups (total 7)	Sample extract
Frequency of Use of System	22	6	I would personalise my email because you see it so often.
Ownership of System	18	6	If something is my own I'd like to change it.
Knowledge of Personalisation	13	3	I don't think I would have done it had I not been asked to. I don't think I would have even noticed that you could have done it.
Ease of Personalisation	4	3	[What would you like to personalise?] Just things on my mobile phone and my laptop. I like doing it because they are all easy to change.
Effectiveness of Personalisation Items	7	3	I like the idea of personalisation but only if it's more specific to me. I'm not really interested in most of the stuff. It's a good idea but it's not specific enough for what I want to see.
Frustration	6	3	I was just really annoyed the day I went and bought that I could not get a silver version of my CD player.
Not Personal	13	4	However much it's pretending to be your individual site you know at the end of the day that all you've done is picked from a list of colours, written a message for yourself. It's not like something especially for you.
Socio-Emotional Context of Use	34	6	...on my friend's phone a little hand comes out and waves goodbye. I think that's adorable. I would like to have that.
Socio-Emotional Functionality	7	3	[What would you like to personalise?] Email. Because you use it for personal messages. And you write personal messages to them.
Work-based Motivation	7	4	I just use it for my email. If I wanna get the news and stuff I go to specific sites. So it's really not that helpful for me [personalisation].
Information	43	7	Well to me it's like, I don't care if it's blue or if it's green or whatever. It's just really the info that I want.
Spare Time	8	4	I wouldn't either [personalise] ... On your spare time you would do it.
Ease of Use	12	4	I always put bright colours in...it's the ease of use, and speed-up.
Save Time	8	3	The reason I want to customise it [portal] is that I can use it to search the particular web site I often visit as quickly as possible so you can save time.
Comfort	5	3	...when you are able to personalise it [web site], it would make you a lot more comfortable with the idea of using that...
Improved Aesthetics	18	5	It's probably the same as if you had an office and you put a picture on the wall. Just to make it look a bit nicer.
Recognition of System	7	3	In my house, there's six of us who have the same phone...And if you got a different ring then that helps.
Familiarity with System	9	4	When you've personalised something you just instinctively know what this thing is.
System Feels Personal	14	5	I liked that [personalisation of Excite], your own little greeting that made it a bit more personal.
Feeling in Control	8	4	[Personalisation] Makes you feel more in control so you actually know what you're doing.
Increased Control	21	5	...on the university computer, the programs that it offers: just cut everything down to bare minimum. To personalise

			truly on what you want on it.
Feeling of Ownership	18	6	It makes it yours [personalisation]. It's like on campus, in your room, you stick up posters up don't you.
Release from Boredom	5	4	I just like blue and I was bored so I changed it.
Fun	9	3	I have an U2 desktop theme on my computer. It plays little tunes to me. It's quite amusing really.
Toy	8	4	It [Excite] just felt like new, like a kind of a toy.
Positive Associations	15	7	I like to scan photos of places I've been to ... Cause I just look at it and ... it brings back good memories and it helps me feel generally positive.
Symbol	6	3	I put [on the desktop] the mountains because I love skiing and because it reminds me of my house.
Reflection of Personal Identity	8	5	Everyone wants to see an identity, their own identity, have this stuff identified. This is mine cause it's got that on it, it looks like that.
Distinction	18	5	Lots of people have computers and laptops and a lot of them do look the same but you can add your own little bit to it and it's like yeah we all have got computers but I've got one with a background.
Duality	4	3	[Why do we personalise?] I think it's partly because most people have phones and quite a few people have the same phone. But I also think it's really nice to have a logo.
Mass-Market	8	4	I'd rather it just didn't look like it came from a shelf in the shop [CP player]. And I know that 50 other people have one at their home. I just wanna be different.
Self-presentation	10	5	Because like with techniques I use to decorate my room it's partly for me to make it feel more like home but I'd also like other people to see my character.
Fashion	4	3	It's become a bit of a fashion accessory [personalised mobile phones].
Reflection of Group Identity	7	3	My best friend sent me a 'Barbie girl' theme tune cause I'm dizzy. So I had that as my ringing tone for quite a while. Quite a good talking point, "why have you got that?"

Table 5.1 List of the number of instances each category is present in the data. The third column refers to the number of groups in which each category was present. An illustration of each of the categories is also provided.

The final stage in the analysis was to conduct selective coding. This is the process of integrating and refining the theory (Strauss & Corbin, 1990). The core concept here, around which the opinions of the participants folded, is the process of personalisation, i.e., Personalisation Behaviour. The categories were divided between those described by participants as being relevant to initiating the Personalisation Behaviour (Dispositions) and those described as Effects of personalisation. Figure 5.2 details this theory of personalisation. The super-categories are printed in bold and the top-level constructs, Dispositions and Effects, are bold and underlined. The Dispositions were divided into

User-, System- and Context-related super-categories, the Effects into Cognitive, Social and Emotional super-categories. The Dispositions and Effects are discussed in more detail in the following sections. Not all of the sub-categories have a separate sub-section and hence when mentioned in the text, the sub-categories are printed in italics.

Dispositions to personalise appearance

User
Frequency of Use of System
Ownership of System
Knowledge of Personalisation

System
Ease of Personalisation
Effectiveness of Personalisation Items

Context
Socio-emotional Context of Use (SEC)

Effects of personalisation of appearance on user

Cognitive
Ease of Use
Improved Aesthetics
Recognition of System

Social
Reflection of Personal Identity
Reflection of Group Identity

Emotional
Familiarity with System
System Feels Personal
Feeling in Control
Feeling of Ownership
Release from Boredom
Fun
Positive Associations

Figure 5.2. Categories in the Theory of Personalisation of Appearance that arose as a result of the GTA in the Two-stage study. The top-level constructs in the theory are Dispositions, Personalisation Behaviour, and Effects.

5.3.2 Dispositions to personalise appearance

As shown in the left column of Figure 5.1, the dispositional categories were divided between User-dependent, System-dependent and Context-dependent super-categories. The individual Dispositions are discussed below.

5.3.2.1 Frequency of Use of System

When asked which device one would wish to personalise, the most popular were mobile phones, portals, e-mail applications and computer desktops. What is common to all of

these is the high frequency of use. Participants indicated that if a device is used frequently, the likelihood of personalising it increases:

> I would personalise my desktop. Just because it's the one thing you look at, every time you turn on the computer, first thing you ever see...so basically something I'm looking at, which I'm using all the time.

Why would usage frequency be associated with an increased likelihood of personalising the device? The most salient explanation is that frequency in its own right increases the need to personalise.

5.3.2.2 Ownership of System

When asked why so many have personalised their personal computers but are nevertheless not that excited about being able to personalise Excite, a common answer would go as follows:

> I think the computer is mine. And nobody else touches it. No, I'm serious. Well oh, boyfriend I guess, but no nobody's allowed to change anything because that's the way I've put it.

In contrast:

> ...on Excite it's just someone else's control of what's the content...

5.3.2.3 Knowledge of Personalisation

Most participants were not aware that they could change the appearance of a portal. Many expressed the view that *awareness* of the ability to personalise and *knowledge* of how to personalise would result in an increased tendency to achieve this process:

> I didn't realise before that you could change. I thought it's on there and someone's designed the *web* site and that's it really. Now that I know it's possible I'll probably look into it.

Relating to awareness of the personalisation process, there were only two subjects who knew of the possibility of changing the appearance of portals. It was not surprising therefore to encounter comments that were concerned with making personalisation of appearance more obvious in this context:

> There should be a big button: "do you want to change colour, do you want to change the pictures"...because the Excite one it's just these tiny little words.

5.3.2.4 Ease of Personalisation

The other side of the coin to personalisation knowledge is system difficulty. At least to novice users of a given device, the level of perceived system difficulty can affect an individual's Disposition to personalise. When asked what devices the participants would like to personalise, one of the participants answered as follows:

> Just things on my mobile phone and my laptop. I like doing it because they are all easy to change.

An illustrative example of the ease of achieving personalisation of appearance can be seen in the evolution of the Windows OS. Each edition has introduced features that have made the personalisation of the appearance of the desktop easier. Windows 95 required users to customise each part of the desktop, such as the screensaver and the wallpaper, separately. Subsequent versions provide 'desktop themes', which enable the user to choose combinations of multi-modal personalisation stimuli with just one mouse-click. Also the ease at which the personalisation wizard is accessed has been improved, which has further contributed to the ease of the personalisation process.

5.3.2.5 Effectiveness of Personalisation Items

Section 5.3.3 makes the case that personalisation of appearance elicits social, emotional and cognitive effects in the user. Importantly, it was found that the effectiveness of the personalisation features in eliciting these effects influences an individual's Disposition to personalise. To illustrate this notion with a negative example, on web sites it is often the case that the user does not have much choice when making changes. That is, the personalisation features are not effective: they do not correspond to the needs and preferences of the user.

> And with Excite you could just go for the colour schemes that they had set, you couldn't like say change the background for this and then the heading title to this. It was their scheme so you chose one of their schemes.

The user has not found the scale of the personalisation wide enough in the extract above. More specifically, the effectiveness of the available items has not been high enough so as to enable relevant choices to be made. Thus instead of regarding the selections as, say, reflecting oneself, the user feels that the items are part of "their" schemes. That is, the personalisation has *not* felt *personal*:

> Like recently I've been personalising my room and that feels like home now. It's got my name on it and everything. But it's no comparison to them [service providers] to just write program and pretend that it's specially personalised.

The lack of effective selections was also found to lead to the user getting *frustrated*:

> Give them [users] lots of options because there's nothing more annoying than when you decide that you want to change something and you go to change it and you look at it and you are like: "I don't want any of these".

A lack of effective personalisation features could be suggested to be one of the greatest pitfalls of user-initiated personalisation. Needless to say, this situation can be avoided by placing enough emphasis on the design process of the personalisation items.

5.3.2.6 Socio-Emotional Context of Use (SEC)

The degree to which the use of a system was associated with a socio-emotional context of use was found to influence users' dispositions to personalise. SEC becomes a relevant category when the device includes *socio-emotional functionality*, such as Short Message Service (SMS), e-mail or games. To illustrate this, one of the participants preferred the personalisation of email to that of a word-processing application. When asked why, she answered:

> On Word when you sit down and write an essay or something and you don't want those colourful flashy things distracting you. But with email it's not just work. You're writing to friends and things.

What seems to be relevant here is that the emotional functionality is complemented with the help of the emotion-eliciting appearance:

> It's already quite personalised [email application] because it's only your emails that go into that site. It would be nice to get a little bit more just colour and stuff because obviously the content is already personalised so the colour could be as well. And photos and whatever, that would just make it even better.

Note that this category was included in the super-category Context rather than System because the user's motivation also plays a role here. In other words, even if a system includes leisure-based functions, an individual is not necessarily motivated to use these. It turned out that users exhibiting a *work-based motivation* to use the system were more likely to personalise the *information* content of a given system as this was seen as being more directly related to task accommodation.

> I don't care if it's blue or if it's green or whatever [the web site]. It's just really the information that I want.

Excite allows its members to personalise the information content of its main page, in addition to personalising the appearance. It was therefore typical for the users exhibiting a

work-based motivation to actually refer to personalising the information on Excite – even when specifically asked about personalising the appearance:

> I liked the fact that you could change what was on that main page. Like it's usually, it's like the headlines, the weather. Straight away you could see things that you were interested in.

If a user with a task-based motivation decides to change the appearance of a product, this is likely to evoke cognitive effects, for instance making the system more recognisable:

> I changed my mobile's ring and volume but other than that ... it's a mobile, it's there for a purpose.

The task-based users acknowledged the emotional value of these cosmetic changes, but it was made explicit that the priority would be given to the task accommodating features:

> I want appearance but first and foremost I want functionality. Preferably both.

Customising the appearance was thus not viewed as something negative among these users. Rather, it was seen as taking place on *spare time*, when not occupied with a task. Especially when it comes to personalising for social or emotional reasons, a work-based user is only likely to change the cosmetic aspects of a system "if on holiday", "when bored", "when avoiding an essay" or "when time-wasting".

> If I didn't have that much time, I just wanted to get straight to what I wanted to get to, I would just go onto it and use it for the reason I'm using it. And it's only aesthetic value, isn't it [personalisation of appearance]? So I would not really bother with it. It's just time wasting. And I don't have time to waste.

5.3.3 Effects of personalisation of appearance

The above section detailed the Dispositions to personalise described by the participants. This section discusses what they described as the Effects of personalisation (see Figure 5.1 for an overview).

5.3.3.1 Ease of use

The prototypical cognitive effect is perceived ease of use. It might seem odd that a non-functional change such as personalisation of appearance can affect this perception. There are, however, attributes related to this feeling that can be accommodated by making changes to the appearance. The perception of ease of use was for instance often mentioned in conjunction with the system becoming more aesthetically pleasing or making parts of the system more recognisable with the help of personalisation:

> Why I like it personalised? ... you can make it easier to use, you can see the buttons.

A common theme associated with ease of use was increased effectiveness. The possibility of personalisation helping the users *save time* when using the application was acknowledged by the users. With personalisation the device would become more familiar and would not contain any useless information:

> [I would like] more flexibility to be able to put on programs that you've used and be able to keep that in your area. Generally just so that it's much quicker, and it cuts out the useless stuff. Every time you logon to the University computer you get that silly little white screen, I don't want that because it takes too much time.

In addition to saving time with the personalised system, the changes were also stated to result in increased *comfort*, an attribute readily associated with the feeling of ease of use:

> But I agree that a lot of people are gonna feel a lot more comfortable if you can change it [personalise].

5.3.3.2 *Improved Aesthetics*

An obvious, and often natural, consequence of changing the appearance of a system is that it becomes more aesthetically pleasing:

> Let's say it's a web site that my friends are using. I mean there are some colours that you just don't find attractive. So this way it does not matter what the initial colour is.

The reason for not casting this category as an Emotional Effect is because the users often associated the aesthetic aspects of the system with task accommodation. Improved Aesthetics would thus involve making the system "easier on the eye", which is more readily characterised as a Cognitive rather than as an Emotional Effect:

> I changed Microsoft Word, the toolbar, the fonts, type, size and colour. Mainly because I was working on it all day everyday and it was easier on my eye.

5.3.3.3 *Recognition of System*

It is often the case, especially with mobile phones, that several people within a peer group own the same model. This would consequently lead to a need to personalise the phone:

> Jo has got one [Nokia 3210] and my other house mate has one so there's three same phones all sitting in the room and it's like "which one is mine"

The aspect of recognition was not only apparent in the mobile context. Also web sites were mentioned:

> Yeah, well you recognise your own site [if you have personalised it], I mean it's like a person you have got on the web now. As opposed to, there's so many sites which you can log into. You get a bit confused.

As with Improved Aesthetics, also Recognition of System could be conceived of as an Emotional Effect. The main implication of this category, however, was a functional one: personalisation made the device distinctive thus enabling the users to gain access to their devices, which in turn makes this effect inherently cognitive.

5.3.3.4 *Reflection of Personal Identity*

The possibility of using the personalised device to express personal identity was frequently mentioned:

> Everyone wants to see an identity, their own identity, have this stuff identified. This is mine cause it's got that on it, it looks like that.

Reflection of personal identity with the help of the personalised device took place through *distinction* and *self-presentation*. There is a certain kind of dialectics taking place here: on the one hand we have a need to distinguish between the 'other' and ourselves. On the other hand, we also have a tendency to express our individuality to others, by externalising oneself to the device. Both aspects are associated with identity expression and could therefore be regarded as opposite poles on a dimension. The isolate pole, i.e., distinction, has to do with asserting one's individuality to compensate for the mass-produced devices. The engagement pole, on the other hand, is associated with using the personalised device for expressive purposes. The next paragraphs illustrate these two aspects of identity reflection.

When it comes to distinguishing oneself from others, a factor that is likely to make this aspect of identity reflection relevant in the HCI context is that in today's market, products tend to be mass-produced. The philosophy is one-to-many rather than one-to-one, which in turn results in thousands, sometimes even millions, of consumers owning any given

product. Personalising the device would thus act as a way to differentiate, to be something else than just one of those millions who own the same product:

> Why I like it personalised? Because it makes you feel more personal. When you are using it you actually feel more than a usual customer, not just some statistics that has bought the product.

When it comes to the devices that were mentioned in the discussion groups, the most extreme situation in regard to the notion of *mass-market* seems to exist in the mobile phone market. When conducting the present research, one of the most popular phone models among the young consumers was the Nokia 3210. One of the participants actually complained that she and all of her five flat-mates owned this particular model. It was therefore a necessity for these individuals to personalise their phones, just to be able to distinguish between these. See the figure below for an illustration on the possibilities to make the phone more distinctive, to avoid the mass-identity of these products.

Figure 5.3. Nokia 3210 was one of the most popular phone models on release at the time of the study. The two images on the left illustrate the non-personalised default phone. The rest of the images illustrate examples of possible covers, which can be added on this phone. In addition to these, also e.g. ringing tones and operator logos can be used to personalise the phone.

Not only does this situation imply that there exists a need to personalise these devices for the sake of identifying or recognising one's own device. The personalisation often takes place with the help of items that enable the projection of one's identity onto the phone. So even if the personalisation primarily took place to be able to recognise it (see section 5.3.3.3), since the personalisation process implies a projection of oneself on the device (and since the personalisation items are of personal nature), it also provides the

means for an individual to distinguish oneself from others, to be unique. The extract below neatly illustrates this *duality*:

> I think it's the combination of wanting to kind of retain your personal identity and practicalities. The ring you want to ring which is sort of you like and enjoy and you recognise is yours but it's also practical. Say you need it to be different and you may find a ring that is particularly annoying or too loud.

The personalised phone was sometimes also compared to the use of clothes as a way to distinguish oneself. When it comes wearing clothes, the situation is sometimes even more extreme than with, say, phones. What follows now is a part of a conversation in one of the groups, which illustrates this analogue:

> – Like a computer. Lots of people have computers and laptops and a lot of them do look the same but you can add your own little bit to it and it's like: "yeah we all have got computers but I've got one with a background". And instead of just going: "yeah I've got a computer", it's something a bit more personal, bit more: "yes I do have personality, I'm not just another random person with a computer".
> – It's the same reason not everybody wears the same clothes. They want to be distinctive and different. You always end up showing, you can generalise people into categories by what they wear, so that in a way gives you a feeling of that person. Before you've even met them, so it's just another extension, electrical devices you have with you all the time.
> – It's like when everyone used to always wear jeans. But you'd have different coloured jeans, different makes, and then you'd wear different tops or whatever with that. And different sorts of shoes. And even though you'd be wearing the same jeans, you could be a totally different sort of person, and it would show through the clothes even though they are still wearing similar things in a way.
> – You did that in school actually with school uniform.
> – School uniform?
> – Fold up your shirt
> – High heels, low heels, trainers
> – Short sleeves, long sleeves, collars up collars down

The extract from a discussion above indicates that individuals are aware of the possibility of distinguishing themselves from others with the help of external objects. Projections of oneself are made; if a device enables this, it has the potential of providing an individual with the means of fulfilling this need. Further, if everyone has the same device, the need to differentiate becomes even higher.

The second aspect of identity reflection was self-presentation. The possibility of using the personalised device for expressing aspects of oneself to others was recognised by many users.

> – It's a message to other people though [a personalised phone]
> – It's something about your personality
> – Yeah this is me, this is what I like, this is what I don't like. And, you know, it just says something about you...It's just another talking point and it leads on to other things, like facets of your personality that come out, you know, just through the fact that it's different.

Analogues were used for describing the personalisation of one's device for self-presentational purposes. A few mentioned the decoration of one's room at the university flats:

> ...with techniques I use to decorate my room it's partly for me to make it feel more like home but I'd also like other people to see my character.

There is a similarity here with Heidmets's (1994) studies with personalisation of environment, where he states that people living in a dormitory have a strong desire to express themselves by shaping their own environment. Comparing the personalisation of one's device to the process of decorating one's room is thus indicative of the potential of products that can be personalised in eliciting a need to personalise these.

5.3.3.5 Reflection of Group Identity

Personalisation of appearance also enabled the users to reflect aspects of group-level identity: the personalisation process had sometimes involved a few individuals. The operator logo of one of the participants had actually been sent to her phone by her boyfriend. This participant seemed to cherish the logo and the theme of the graphic was associated with the perception the boyfriend had of her. The externalisation of the graphic could then create a mutual, shared concept, a factor binding these persons together:

> You always tend to leave [personalised desktop], if one of your mates has done it. Then every time you turn your computer back on ... it makes you smile because you know that your friend has done it.

Note that this category will be further elaborated on in the next chapter, which is concerned with the personalisation of mobile phones.

5.3.3.6 Familiarity with System

One of the cognitive effects was Recognition of System. Moving to the emotional side of the dimension, we could claim that there is a point at which recognition changes to a feeling of familiarity. Although these two are correlated concepts, the former is associated with accomplishing a task whereas the feeling of familiarity is more associated with the socio-emotional qualities of system usage.

The fact that cosmetic personalisation was found to result in a feeling of familiarity is not surprising – the changes that are made by the user imply that the user focuses attention on various aspects of the system. It is expected that this attention results in a higher degree of familiarity with the system. Several ways were used to describe this feeling. For instance, it was mentioned that personalising a site enables one to "instinctively know what this thing is". The personalised site could also act as a "familiar starting point" from which to start traversing to other sites. These opinions refer to the importance of a sense of familiarity being created, a perception especially important if the site is used as a portal. It was not surprising therefore that the concept of 'home' was used to refer to this personalised starting point:

> That's exactly what you need for a portal [user-initiated personalisation]. You do a portal – it's the first page you open up. First place you go to is your home. You go to your home and then you go somewhere else.

What the users seem to appreciate is a feeling of familiarity to be associated with their 'bases' on the Internet. The underlying logic here could be that there is a need for familiarity on the web as the Internet represents a large body of non-familiar information. Personalisation of a web page would thus create a sphere on the Internet, a sphere that is familiar to the user, controlled by the user. This sphere – the home – then stands in contrast to the 'other', uncontrollable. In effect, familiarity would contribute to the feeling of a base from which the user can start exploring the Internet.

5.3.3.7 System Feels Personal

Perhaps unsurprisingly, participants often commented that personalisation made a product feel more personal:

> I liked that [personalisation]. Your own little greeting that made it a bit more personal.

It is possible that this is just a reflection of the prompt to describe personalisation and in a sense this whole section is an attempt to define the various meanings 'personal' might have. Nevertheless it is included here as it was mentioned so frequently by participants.

The term personal was often used in conjunction with feeling in control or a feeling of ownership, included as separate categories below.

> It kind of makes you feel more like its yours. It's actually personal to you.

5.3.3.8 *Feeling in Control*

It was found that there exists a need to *increase the feeling of control* over the interaction with the computer. The fact that the complaints regarding the lack of influence on the appearance and the layout of Excite were so numerous is one indicator of this:

> I do like the idea of having the sort of Excite thing, having loads of different information that you choose. But just to have much more control over the appearance of it and the content rather than just being able play around with what is the sort of basic laid out format.

Though the participants were able to influence the interface, the extent to which they were able to do this was often not seen as being enough. A higher degree of control was thus needed. The need for more control was not only directed toward the context of Excite. Concerns regarding a higher influence toward the way the desktop – and sometimes even the operating system itself – are organised were also expressed.

Interestingly, the data led to the conclusion that personalising the appearance of a system increases the feeling of control:

> If it's your own desktop you've got control over it and no one else is changing it whereas on Excite it's just someone else's control of what's the content.

5.3.3.9 *Feeling of Ownership*

The importance of ownership is highlighted by the following extract in which personalisation of a device was compared to the process of decorating one's room:

> It makes it yours [personalisation]. It's like on campus, in your room, you stick up posters up, don't you. And you stick things you want on your wall. Put your own duvet cover on.

The analogue supports the idea of demarcating an object to increase the feeling of ownership over it. One's room on the campus can certainly be seen as belonging to the

area one would regard as one's own. One could analogously assume that, say, a phone, which follows its user everywhere could be seen as an immediate extension of oneself. Ownership thus becomes a relevant theme here.

5.3.3.9 Release from Boredom

Users sometimes get bored with aspects of the appearance of the system and want to change them. The personalised stimuli have ceased to be effective in eliciting emotions in the user:

> On one hand it's nice to have it personalised so it's yours so you recognise it. But it's also nice to change it every so often. Because you get bored with it being the same all the time. You want something new.

This category would explain the need to personalise something again and again. As time goes by the user becomes desensitised to the previous personalisation, resulting in the need to re-personalise the device.

5.3.3.10 Fun

The comments concerned with reacting to the personalised device often referred to feelings of amusement or fun:

> I have a U2 desktop theme on my computer (laughing). It plays little tunes to me. It's quite amusing really.

Associating feelings of fun to the use of a personalised system is further indicated by the fact that words such as '*toy*', 'gimmick', and 'gadget' were used to describe these personalised devices. Consistent with this:

- It's fun, isn't it [personalisation of appearance].
- Yeah, it's just something to play around with.

5.3.3.11 Positive Associations

Several comments were made, which referred to the personalised system evoking positive associations in the user. Sometimes, general positive items were used to elicit these feelings:

> I'm sticking to the flower, because I turn it on and think, oh it's sunny outside.

Some individuals, on the other hand, used items that were specific to their lives:

> I put the mountains [on the desktop of a PC] because I love skiing and because it reminds me of my house. So each time I put it on, I was like: 'Oh yeah'.

In both of the extracts above the items that were used to decorate the system act as *symbols*, i.e., they refer to an entity – a person, feeling, place, event, concept – in the outside world. To elaborate on this notion, Hansen & Altman (1976) distinguished six basic means of personalising the environment:

1. Representing one's bond (love, affiliation) with specific people (hanging up photographs of one's girlfriend etc.)
2. Representing one's values (political, religious, philosophical etc.) by displaying slogans etc.
3. Representing one's aesthetic orientation by e.g. displaying pictures, paintings, photographs etc.
4. Indicating a specific event by putting up calendars, maps etc.
5. Indicating through objects one's own penchant in leisure-time activities: sport activities etc.
6. Representing one's own interests (by hanging up posters of rock groups, athletic teams, etc.)

Of the above categories, all but one (aesthetic orientation) are primarily achieved by means of symbolic personalisation items. In psychological terms, the items act as stimuli, which elicit a mental representation of an external event (Scheiberg, 1990):

> I like to scan photos of places I've been to if I've had really good holidays. Cause I just look at it and it's an attractive photo it brings back good memories

5.4 Discussion

Section 5.4.1 discusses the Theory of Personalisation of Appearance and aims to draw a direction for the rest of the thesis. Finally, section 5.4.2 concludes this chapter.

5.4.1 Personalisation of appearance: theory and future research directions

This chapter has described the Theory of Personalisation of Appearance (TPA). In this theory, User, System and Contextual Dispositions lead to Personalisation Behaviour. This has Cognitive, Social and Emotional Effects on the user. TPA includes four levels of constructs. The words Dispositions, Behaviour, and Effects are used to refer to the most generic level. These will be referred to as *top-level constructs*. The second highest level of analysis in TPA consists of *super-categories*. These include User-dependent, System-dependent and Context-dependent Dispositions and Cognitive, Social and Enduring Emotional Effects. The main *categories* represent the third level of TPA and *sub-categories* the lowest level. Figure 5.4 illustrates the basic structure of the theory.

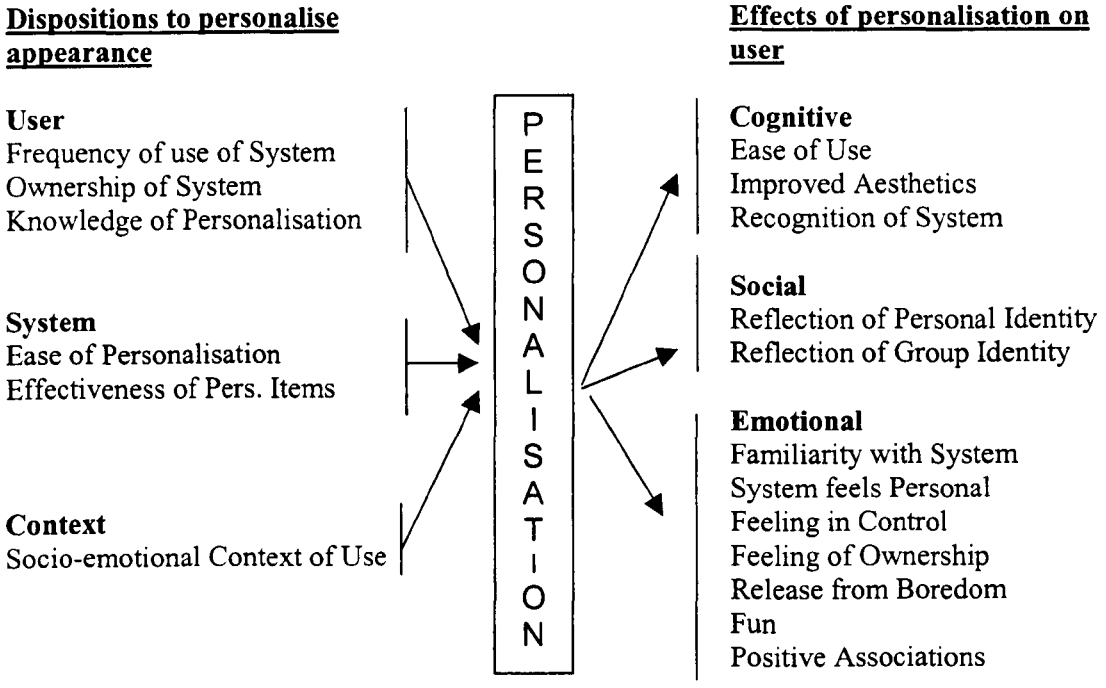


Figure 5.4. The Theory of Personalisation of Appearance. Dispositions lead to Personalisation Behaviour, which in turn elicits Effects in the user.

An interesting question regarding the theory is the exact role of the Effects of personalisation. One could argue that issues such as ease of use and identity expression should rather be viewed as motivating factors, not as effects of personalisation. It is conceivable that a user personalises *in order* to elicit any given Effects listed in the theory, which in turn would make the role of these factors as Effects in the theory questionable. This issue was realised when conducting the GTA, and as a counter-argument to this problem, a factor that motivates an individual might as well be thought of as an effect due to the fact that the behaviour takes place to accommodate the particular motivational force. To illustrate this, a person may personalise to be able to express her identity with the help of the device. Once this process has been achieved, a natural effect is the ability to express identity. The argument thus goes that the effects could also be referred to as motivations. The reason for referring to these as Effects in our theory is because this is the way the participants in the study regarded them. This issue is taken up in the final chapter.

The theory generates design recommendations. For instance, the Dispositions shown on the left side of Figure 5.5 may be used to determine whether a need exists in any given device to provide the user with the opportunity to personalise it. The present theory will

be further developed in the next two chapters and the user is therefore asked to consult the discussion section of Chapter 7 for a more complete set of design implications.

Two theories have emerged as a result of the Two-stage study: the TPA and the Theory of Personalised Recommendations. Though both of them are at an early stage in terms of maturity and generality, they nevertheless generate ideas for controlled experiments. As discussed in the previous chapter, an interesting way to test the Theory of Personalised Recommendations would be to determine whether the categories that were hypothesised to facilitate the use of a RS really act as facilitators. The TPA, on the other hand, is more complex and produces more ideas for future experiments. For instance, it would be interesting to investigate whether the Dispositions in the theory lead to personalisation and furthermore, whether the personalisation behaviour effects the magnitude of the Effects. Moreover, the theory proposes a certain causality, with the Dispositions leading to Behaviour, which in turn leads to Effects. It would also be important to test whether this causal order bears implications on real Personalisation Behaviour.

Prior to proceeding to test some of these questions in Part 3, it is nevertheless necessary to maximise the generality and the reliability of the theories. For instance, it is important to determine whether the same issues are relevant in another user population, device or context of use. That is, perhaps the weights of the categories in the theories are context-dependent. Conducting these kinds of validation studies also contributes to the maturity of the theories, as further work is likely to result in elaborating these frameworks and making them more general.

In metaphorical terms, the evolution of the thesis is currently standing at a crossroads. Both theories call for further empirical work and elaboration, and a choice has to be made, as to which particular theory is selected for further scrutiny. The area which seems more promising, is personalisation of appearance. This personalisation feature is likely to generate more opportunities to investigate this phenomenon, as it seems to be a more common process than that of receiving personalised recommendations. Focussing on personalisation of appearance in the rest of the thesis is also more practical for realistic experiments. As we have shown, the views toward a RS depend on the quality of the environment and the algorithm. Creating these systems for controlled experiments would therefore require considerable knowledge in programming and graphical design.

The remaining chapters of this thesis will thus concentrate on validating and testing the TPA. As discussed above, a possible way to further investigate the theory is by focussing on the same process but from the point of view of another device or user population. Of

interest is how the theory evolves with the increasing number of research approaches taken. The next two chapters continue the qualitative approach described in chapters four and five by concentrating on the personalisation of appearance of mobile phones and desktops of computers among a range of users. Once the theory has reached more maturity and generality, Chapters 8 and 9 describe two quantitative studies that were conducted to validate and assess the theory. These chapters take into account the problem of exploratory research – an issue described in the context of the type one error in Chapter 3 – by generating research that is not exploratory but, rather, confirmatory. Further discussion on the TPA, such as placing it in a wider theoretical context, will take place in the final chapter.

5.4.2 Conclusions

The TPA lists factors that influence an individual's likelihood of personalising a device, as well as effects of this process. The dispositions can be divided between User, System and Contextual super-categories. For instance, if a device is used frequently (User Disposition), is easy to personalise (System Disposition) and is associated with a socio-emotional context of use (Contextual Disposition), the likelihood to personalise the system increases. The effects can divided between Cognitive, Social and Emotional ones. Ease of use, reflection of identity and familiarity with the system are examples of the respective categories.

The theory represents the first attempt to qualitatively investigate the user implications of personalisation of appearance. It is therefore currently impossible to determine, e.g., the weight of the factors in the theory and whether the theory would have to be refined when investigating another device or user group. Further empirical work is therefore needed on the theory. The next two chapters describe follow-up studies that took place to elaborate the theory. The relation of the theory to real personalisation behaviour is investigated in Chapters 8 - 10, and Chapter 11 concentrates on discussing theoretical implications of the theory and on drawing conclusions on the thesis as a whole.

Chapter 6. Finnish study

6.1 Introduction

Chapter 5 describes a theoretical framework that is concerned with understanding the user experience associated with changing the way a device looks like. This chapter presents an attempt to make the theory more general by focussing on a novel user population and context of personalisation. Discussion groups on the personalisation of mobile phones were run on Finnish high school students. Should new categories arise, these would be added to the TPA. It was also possible to determine the degree of overlap between the categories generated here and in the previous study. This was thought to provide an indication of the ability of the theory to predict novel contexts. As a further attempt to verify the TPA, three judges, naive to the coding categories by the coder/analyst, were each given rudimentary instructions and a transcript of one of the Finnish groups. The codes generated were then compared with those of the investigator to assess inter-coder agreement.

The context of mobile phone personalisation and the population of Finnish teenagers were chosen because it was thought this scenario would be associated with a particularly pronounced personalisation experience. In the previous study, several participants spontaneously took up the notion of personalising their phones and in Finland mobile telephony is an even more popular mode of communication than in the UK. In 1999, 61% of the Finns were mobile subscribers, compared to a corresponding figure of 29% in the UK (Gsmgroup, 2002). For teenagers the interaction with mobile phones is known to be an especially important process (Kasesniemi & Rautiainen, 2002). Although there is no explicit research on teenagers' personalisation habits, it was nevertheless assumed that personalisation would be an integral process for this user population.

6.2 Method

The method section is divided to three separate subsections: discussion groups, refining the theory and inter-rater reliability of the coding scheme.

6.2.1 Discussion groups

6.2.1.1 Participants

Each of the three focus groups consisted of five female high school students. The subjects were all students at a Finnish high school in Helsinki. The age of the participants varied between 16 and 18, with the mean being 16.5 years. Opportunity sampling was used to recruit the subjects and each participant was given a monetary reward for participating. To be able to take part in the study, the subject had to own a mobile phone. Consistent with the Two-stage study, precautionary measures were taken to minimise potential biases arising from the social dynamics of group settings. First, none of the participants were personal acquaintances of the facilitator. Second, the participants within the groups were also relatively unfamiliar with each other as individuals from any given class were allocated across the groups.

6.2.1.2 Discussion group procedure

Due to the participants being relatively familiar with personalisation of appearance of mobile phones, the present study was not associated with an introductory stage. The author moderated the discussion sessions and they took place in a small-size classroom of the high school the students were attending. The interviews took place in the afternoon hours and each session lasted ca 75 minutes. An interview protocol was used, which enabled the same questions to be asked in all of the groups. Appendix 8 includes the questions. In the initial stage of the session the participants were asked to introduce themselves and explain their mobile phone usage history and patterns. Toward the end, the questions started focussing on the user experience associated with mobile phone personalisation. The sessions were videotaped and later transcribed on the basis of the tapes. Note that the interviews took place in Finnish and the extracts that are presented in this chapter are therefore translations.

6.2.2 Refining the theory

The coder/analyst first labelled the new data set, i.e., the transcribed discussions, with the categories from the TPA. The categorisation included three iterations to optimise the reliability of this process. Second, extracts or issues in the transcripts that could not be explained by the theory (illustrated in Figure 5.3) but which were nevertheless relevant with regard to the personalisation process were identified and analysed further. This analysis involved memo-writing and open coding around the novel issues. Axial coding was achieved by integrating the novel categories into the existing theory. In addition to identifying novel categories, the GT process resulted in refining one of the existing categories.

6.2.3 Inter-rater reliability of the coding scheme

The process of determining the agreement between the theory and the external judges involved three stages: categorisation on the basis of the model (achieved by the author, see Section 6.2.2 above), categorisation by external judges and comparison of these categories. Note that the novel categories were included in the process of determining the inter-rater agreement.

The external judges categorised the transcripts as follows. Three Finnish-speaking judges, naive to the coding categories by the author, were each given rudimentary instructions and a transcript of one of the Finnish groups. That is, Group 1 was assigned to Judge 1, Group 2 to Judge 2, etc. The judges were all students at the University of York.

The categories they constructed were in Finnish. The author met with each of the validators three times, individually. The judges were provided with instructions during the first session and the next two consisted of collecting and refining the categories and models produced by the judges. To make this process more consistent with the grounded theory analysis, the second session was associated with finding out how the judges had coded the transcripts. The word 'code' is used as this second meeting was involved with dealing with the initial stages of the analysis process. The final session, on the other hand, was associated with the judges elaborating on this initial process by creating meaningful categories of the extracts and codes that they had originally identified.

The sections below provide further descriptions of each of the three sessions.

6.2.3.1 Session 1: Introduction

The aim of Session 1 was to provide each judge with general instructions and the necessary materials. The instructions were given both verbally and in a written form (see Appendix 9). The participants were to highlight each extract that was associated with a disposition to personalise or the effect of this process on the user. They were then asked to write down the number of the extract and a few words that characterised that utterance on a separate peace of paper. Note that the judges were not aware of the theory created by the author. The categories that were constructed were independent of the present theory. The fact that the judges were asked to conduct the rating by identifying the dispositional factors and effects of personalisation influenced the way in which the judges categorised the data but this was necessary to accelerate the coding of the transcripts.

To maximise the understanding of the interviews, the judges were provided with videotapes of the groups, which they were to watch prior to starting the categorisation process.

6.2.3.2 Session 2: Presenting the codes

Session 2 consisted of going through each of the extracts highlighted by the judges. This included prompting further into the meaning and implications of each label or description. Leading questions were avoided so as not to influence the judge's framework. The point of this session was to make the judges verbalise and reflect on the issues they had been dealing with when conducting the coding. This way it was hoped that they would gain more insight into the meanings and interrelations of the relevant factors.

6.2.3.3 Session 3: Constructing the categories and the model

The purpose of the Session 3 was to have the judges further elaborate on the codes that were collected during the second session so as to enable the construction of categories and eventually a model of personalisation. The extracts identified by the participants had been

allocated on separate pieces of paper prior to the meeting. The extracts were then given to the judges one at a time, in a random order. The judges' task was to sort the extracts such that each pile would represent a separate category. Once the extracts had all been allocated to groups the judges were then asked whether they felt any of the extracts in any of the categories should rather be assigned to another category. Once the judges were satisfied with the categories, they were then asked to group together categories that had aspects in common. They were asked to name these 'super-categories', which consequently led to the construction of a model of personalisation of appearance.

6.3 Results

The results section consists of three main areas: refining the theory, assessing the transference of the categories and the inter-rater agreement.

6.3.1 Refining the theory to improve its generality

As described in the method section, three iterations of categorising the data were performed. There were 219 utterances relevant to personalisation. Out of these, a total of 97 extracts could not be assigned to the existing categories, or required the elaboration of a previously existing category. Axial coding on these resulted in the construction of six new categories: Cost of Personalisation, Absence of Technical Constraints, Seasonal and Media Influences, Peer Influence, Attachment to System, and Accommodating Current Emotional State. The first four are Dispositions, whereas the last two are Effects of personalisation. In addition to adding new categories, the category Reflection of Group Identity was further elaborated to include three subcategories: Expression, Cohesion, and Fun with Peers. Table 6.1 lists the six new categories, whereas Table 6.2 is concerned with illustrating how the category Reflection of Group Identity was refined. In each of these tables, the first column gives the name of the category devised by the coder. The next two columns give the total number of instances of utterances instantiating this category and the number of groups (out of three) that had at least one instantiation,

respectively. The last column gives a typical example of an utterance illustrating the category.

Category	Freq.	Groups (total 3)	Sample extract
Accommodating Current Emotional State	10	3	The ringing tones reflect my mood.
Seasonal and Media Influences	5	3	Quite a few people under Christmas time order 'Jingle Bell' stuff to their phones.
Peer Influence	27	3	[What makes you personalise?] Someone has put in something interesting [operator logo], so I'm like: "OK, I'll go and get one too".
Cost of Personalisation	6	3	It's easy to buy mobile phone accessories, as they are not so expensive.
Absence of Technical Constraints	9	3	It annoys me that I cannot send logos to my phone.
Attachment to System	17	3	It's like your [personalised phone] own little, not an animal, but your 'little one'.

Table 6.1. List of the number of instances of the new categories present in the data. The third column refers to the number of groups in which each category was present. An illustration of each of the categories is also provided. The illustrations are translations from Finnish.

Category	Freq.	Groups (total 3)	Sample extract
Expression	6	3	[Q: Why do you personalise?] ...friends think in the same way. So when we are together [we personalise].
Cohesion	5	2	We have these stories amongst friends [that are used to provide ideas for personalisation]...Not necessarily anything that people generally would like, but mainly among your friends.
Fun with Peers	12	3	And my mates sometimes change the ringing tone on my phone [as a practical joke].

Table 6.2. Illustration of the refined category Reflection of Group Identity.

The subsequent sections provide descriptions of the new and refined categories.

Cost of Personalisation

It is easy to understand that the price-level of the personalisation item can in many cases affect a user's Disposition to personalise. This is especially true for users from younger age groups.

> I suppose when these things [personalisation items] get cheaper, then I could consider personalising the phone.

Absence of Technical Constraints

The phone models of a few users were quite old. Consequently, these phones were not associated with as many personalisation options as some more recent models would be. This sometimes led to a situation in which the need to personalise existed but due to the technical constraints, the user would not be able to accomplish this process:

> I've noticed that the 5110 [a phone model], which you cannot change that much, people often say that they would change it more if they could.

Interestingly, one of the participants compensated for the inability to change a particular feature by achieving another type of personalisation:

> I could not change the covers in my phone so instead I painted them with nail polish.

Clearly in this case, the participant felt a need to change the phone and as it was not possible to satisfy it in the traditional way, she overcame the constraint by resorting to a less traditional method. On the basis of only three discussion groups on mobile phone personalisation it is impossible to make inferences on the frequency of this compensatory process. One could nevertheless conclude that it is indicative of the fact that among some users, the Disposition to personalise a device may reach a relatively high magnitude.

Seasonal and Media Influences

Different kinds of seasonal and media themes relating to festivals, time of the year or currently popular cartoon characters were reflected in the personalisation of phones. As the interviews took place shortly after Christmas, one of the participants referred to using a 'Jingle Bell' theme:

> Quite a few people around Christmas time order 'Jingle Bell' stuff to their phones. And when there was this Star Wars boom, I was really excited as well. I ordered the 'Darth Vader' theme tune.

Peer Influence

Personalisation was incorporated by many of the friends of the participants and this was a major cause of personalisation. This category was cast as a contextual Disposition.

> When I changed the logo for the first time, one of my friends had the same kind of a thing on her phone. I'm not that bothered, but I suppose I will go on and order it as well. You get influences from your environment.

Attachment to System

One of the participants referred to her phone as a living thing, a pal. Another one regarded it as a personal friend. A third person had actually named her phone. Someone even assigned it the status of a pet:

> It's like a little pet. Oh well, we do have a dog at home but the phone is like your own little...not an animal but 'your little one'.

Personalisation was a process contributing to the attachment:

> Well, you get attached to the phone and it's more comfortable, as compared to if you could not personalise it.

Relative to the number of discussion groups that were run, comments referring to attachment toward the personalised phone were frequent. It is argued that the process of personalisation can result in the phone becoming more than just a tool. The emotionality that is reflected in the form of the attachment represents value additional to the functional status of the device. Hence, a phone that cannot be personalised would "only be a phone" or "a device that is used for phoning up somebody". Clearly there is a difference here between the functional and emotional statuses of the device.

Accommodating Current Emotional State

Several members of the discussion groups personalised to accommodate their current emotional states. As compared to identity-related personalisation, changing the device as a function of the current feeling refers to a more transient form of personalisation. After all, identity would be associated with something stable and unchanging whereas the mood is likely to change relatively often:

> I change the ringing tone constantly, just according to how I'm feeling. At the moment I've got Red Hot Chilipeppers' 'Other side'.

An interesting aspect of this form of personalisation is that in addition to using it to express the current feeling state, it could potentially also serve as a means of defining the current feeling. This would take place by using the externalised mood state as a stimulus in amplifying the current inner mood state. Personalisation could thus act as an external means of regulating inner feeling states.

Elaborating on the category 'Reflection of Group Identity'

There was a wealth of comments relating to the previously established category Reflection of Group Identity. The large amount of data associated with this category resulted in elaborating it with the help of three subcategories: Expression, Cohesion, and Fun with Peers.

The subcategory *Expression* implies that personalisation sometimes served to express aspects of group identity. The supposition here is that personalisation can serve as a talking point and a mechanism for creating and expressing mutual values or ideas. In the extract below, the aspect of group identity that is expressed through personalisation is interest toward cars:

> ...you do talk about it [personalisation]. Like this weekend we were spending some time together and then we got an idea to, you know 19-20 years old people like cars, so we got an idea to go and order a car logo to a mate's phone. So we had to find a logo to his phone, a Ford one or something. So we browsed

through the net and tried to find as nice a Ford as possible. So that's how you talk about it [with your friends].

In addition to expressing aspects of group identity, the instance above also points to the possibility of improving the *group cohesion* with help of the personalisation process. Schachter (1951) defined the notion of group cohesion as 'the cement binding together group members and maintaining their relationships to one another'. It was later found that commitment to the group task accommodates group cohesion (Mullen & Copper, 1994). For instance in the extract above, personalisation constitutes the object of a shared activity and it could hence be seen as one of the mechanisms contributing to group cohesion. Another illustration of personalisation constituting a shared activity is the exchange of personalisation items. For instance, a person can logon to a site and select ringing tones or operator logos that are sent to another user's phone. This was, in fact, a frequently mentioned activity:

And someone sent me this logo [boyfriend]. I'm not going to change it because I'm attached to it.

Sending logos to each other also took place in peer groups and in addition to logos, the friends would sometimes come up with slogans for their phones' greeting messages. These slogans would often be such that only a member of that specific group would understand the meanings of these:

[Q: What kinds of slogans do you come up with?] Inside things. Jokes that others cannot really understand. So when they would see the greeting they would be like: "what on earth?"

Engaging in these shared activities could improve the group cohesion. A common object of interest is incorporated which in turn functions as 'social glue' improving the relations between the group members.

Finally, several examples were mentioned which involved a group of friends personalising for the sake of having *fun with peers*. Often this was achieved by making practical jokes, such as changing the language settings or setting up the alarm clock in a friend's phone.

The strong social identity element associated with mobile telephones is supported by similar findings regarding the mobile phone SMS culture. Kasesniemi & Rautiainen (2002) report on the collective behaviour that Finnish teenagers' text messaging incorporates. Text messages are circulated among friends, composed together and read together. Thus, through the use of SMS, conclude these authors, teenagers collectively engage with each other and sustain their teenage relations.

6.3.2 Transference of the categories

An integral part of assessing the theory is to examine the extent to which the categories were present in both studies. The theory can be claimed to be associated with high generality if there is a high degree of overlap between the studies. The overlap will be determined in terms of the main categories only as there is a danger that a more detailed level of analysis introduces too much granularity to the notion of overlap.

Of the 18 main categories that were identified in the original study, 14 also occur in this study. The figure below illustrates the overlap. The categories that were present in both sets of data have not been changed. The new ones are underlined and the categories that only occurred in the Two-stage study are shown in italics.

Dispositions to personalise appearance

User
Frequency of Use
Ownership of System
Knowledge of Personalisation

System
Ease of Personalisation
Effectiveness of Pers. features
Cost of Personalisation
Absence of Technical Constraints

Context
SEC
Seasonal and Media Influences
Peer Influence

Effects of personalisation of appearance

Cognitive
Ease of Use
Improved Aesthetics
Recognition of System

Social
Reflection of Personal Identity
Reflection of Group Identity

Emotional
Familiarity with System
System Feels Personal
Feeling in Control
Feeling of Ownership
Release from Boredom
Fun
Positive Associations
Attachment to System
Accommodating Current Emotional State

Figure 6.1. Coding overlap between the theory developed from the Two-stage study and the present study. The new categories are underlined. The categories that only occurred in the Two-stage study are shown in italics.

The high degree of overlap shows that the theory stands up well when applied to the Finnish mobile phone users. Six new categories were added. Of these the System Dispositions Cost of Personalisation and Absence of Technical Constraints can be thought of as extremes of Ease of Personalisation, which did not occur here. Accommodating Current Feeling is a new Emotional Effect and the two Environmental Dispositions Seasonal and Media Influences and Peer Influence were not apparent in the earlier discussion groups using English university students.

Whereas the new categories (underlined in Figure 6.1) would appear to be explicable in terms of the different priorities of the users, the missing categories (Italics in Figure 6.1) may be explained by differences in the devices discussed. In the Two-stage study the focus was PC and mobile phone personalisation. In the present study it was only mobile phones. The categories that did not occur in the latter study were Ease of Personalisation, Ease of Use, Familiarity with System, and Feeling in Control, categories that it may be hypothesised are more closely related to computer usage rather than mobile phone use for this population.

6.3.3 Inter-rater agreement

Measures of association were calculated to determine the levels of agreement between the coding of the coder/analyst and the external judges. The measure chosen is based on the notion of proportional reduction of error (PRE)[1]. According to Norusis (1993, p.213),

> "...these measures are ratios of a measure of error in predicting the values of one variable based on knowledge of that variable alone and the same measure of error applied to predictions based on knowledge of an additional variable."

The measure assesses the predictability that items put in the same category by one rater are also put in the same category by another rater. No assumption is made about the equivalence of the meaning of the category names for the two raters. The sampling units (rows in SPSS) were the transcript extracts. Two variables were created. The first contained the categories assigned to each extract by the author, i.e., the model, and the second included the corresponding categories of the judges. As one might expect given the short time available to the judges, the external judges did not categorise as many extracts as the author had done. A category 'not coded by the judge' was thus created to account for these instances.

The two variables were crosstabulated. The measure of association indicates the degree to which the independent variable predicts the outcome of the category with the largest proportion of observations (the modal category). The magnitude of this value depends on the direction that has been adopted. In this case, the categories of the author constituted the independent variable and the judges' ratings the dependent variable.

Two agreement indices, Goodman and Kruskal's taus, were calculated. One included the utterances belonging to the category 'not coded by the judge', and the other one excluded these. For the first case, the taus were .55, .54, and .58 for Groups 1, 2, and 3, respectively. For the second, the respective taus were .84, .86, and .80. All of these figures were significant at the .001 level. Note that when calculating these indices, cases in which more than one category shared the largest proportion of observations were ignored. This took place in seven of a total of forty-five cases.

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[1] This is an alternative to chi-square-based measures. With PRE measures, argues Norusis (ibid.), the meaning of association is clearer.

Group	Goodman and Kruskal tau (includes the category 'not coded')	p	Goodman and Kruskal tau (excludes the category 'not coded')	p
1	.55	< .001	.84	< .001
2	.54	< .001	.86	< .001
3	.58	< .001	.80	< .001

Table 6.3. Measures of association between the theory-based categorisations (independent variable) and the categories constructed by the external judges (dependent variable). Each group was assigned to a separate judge.

On the basis of the indices illustrated in Table 6.3, it could be concluded that there was a high level of agreement between the theory-based and the judges' categories particularly when the category 'not coded' is excluded. That is, the theory-based categories predicted the outcome of the modal category of the external validators at a high level of accuracy.

The modal category for the judges was 'not coded' in 29 % of the cases which explains the decrease in the agreement index when including these instances in the crosstabulation. It could, however, be argued that the inclusion of the non-coded cases produces a conservative a measure. The models that are being compared here did not take an equal time to develop. The theory of personalisation is more mature than the judges' models, which in turn would result in the judges missing some of the categories. The judges also analysed a relatively narrow area, one discussion group each. It would therefore be natural for them not to regard issues that do not appear in the transcripts often as being relevant to the process of personalisation. This could be summarised such that the measures including the category 'not coded' should be ignored because they do not provide us with an accurate picture of the situation.

Goodman and Kruskal's tau makes no assumption about the equivalence of the categories used, only that the same items go together. For instance, if coder A referred to a set of utterances as happiness and coder B consistently referred to the same set of utterances as sadness they could still get a tau of 1 indicating a high level of agreement. To rule out this possibility the semantic similarity between pairs of categories was assessed by the coder/analyst. Of a total of 33 pairs, there were 18 clear semantic matches, 14 reasonably good matches and one pair where there was no similarity. Overall these data indicate a high level of spontaneous inter-coder agreement that validates our interpretation of the transcripts. For further details on how the semantic match was determined, consult Appendix 10.

6.4 Discussion

This chapter described a study, which attempted to increase the generality of the theory by investigating a novel device and user group. Changing the focus of the research resulted in refining the theory by adding six new categories to it and by elaborating an existing category. As two studies have now been conducted on the personalisation of appearance, it was also possible to acquire an indication of the generality of the theory by determining the degree of overlap between the categories that were present in this and in the previous studies.

Section 6.4.1 discusses how the theory was refined. Section 6.4.2 is concerned with the transference of the categories between the two studies and Section 6.4.3 discusses the inter-rater agreement of the theory. Finally, 6.4.4 discusses the evolution of future investigations on this area.

6.4.1 Refining the theory

Studying Finnish mobile phone personalisers resulted in adding six new categories to the TPA. First, the category 'Cost of Personalisation' was cast as a System-related Disposition. The supposition here is that, for some user groups, such as teenagers, the cost of the personalisation process negatively affects the likelihood of accomplishing this process.

A second category cast as a System Disposition was 'Absence of Technical Constraints'. This category implies that the technical features of the device may be such that one cannot personalise it, which in turn has an effect on the likelihood of changing it.

Third, the category 'Seasonal and Media Influences' was included in the theory as a Contextual Disposition. This category refers to changes motivated by seasonal and media-related themes, ranging from national holidays such as Christmas or Easter to currently popular films or cartoons.

An important category in the context of mobile phone personalisation was 'Peer Influence'. Quite simply, friends or relatives often play a role in an individual's decision to personalise.

Fifth, feelings of attachment were developed towards the personalised phone. This category was regarded as an Emotional Effect. When a user would get attached to the

device, she would regard it as a "personal friend" or a "living thing". In contrast, a phone that could not be personalised would be regarded as "just a phone" or a "device that is just used for phoning up somebody".

Finally, it was found that individuals personalised to accommodate their current emotional states. This type of personalisation was hypothesised to take place on a shorter time scale as compared to changes motivated by, say, ownership.

Not only did adding new categories to it change the theory, rich descriptions were provided regarding the existing category 'Reflection of Group Identity', which led to further elaborating the category. It was found that reflection of group identity often took place by expressing the group level identity. For instance, a group of peers might search together for a suitable logo for any given individual's phone, to express a shared interest toward, say, cars. The idea here is that personalisation can act as a mechanism for creating and expressing mutual values. Extracts relating to identity expression were also often associated with improving the group cohesion by incorporating personalisation as a shared activity. A final aspect of the group identity is that sometimes personalisation was a way of having fun with peers.

It is interesting to note that the group identity category was more prominent in the mobile phone interviews as compared to the original study that was mainly concerned with the personalisation of portals. Similarly, the category 'Ease of Use' was not present in these interviews. The differences may be due to the device influencing the relative weights of the categories in the model. In the Two-stage study, aspects relating to ease of use seemed to be salient, whereas when focus was geared on mobile phone personalisation, social identity was a relevant theme. Of interest will be whether the next study, namely interviews with home PC users, will bring about its own device-specific categories.

In addition to the notion of device-specificity influencing the weights of the categories, it is also plausible that the user group plays a role. The importance of the cost of personalisation was not an issue in the original study, which was conducted with university students. However, when focussing on teenage users, it became an important theme.

Taking into account the type of device or user group adds an interesting dimension to the present theory in that it would have to be viewed in a more dynamic way. The notion of various factors affecting the weights of the categories is a rather interesting one and will be discussed further in Chapter 10.

6.4.2 Transference of the categories

The results section indicates that approximately two thirds of the original categories also occurred in the mobile phone groups. This is a relatively high consistency and indicates high generality for the TPA. The fact that the absence of some of the categories could be contributed to the above-discussed notion of device-specificity further promotes this.

One could argue that the theory has reached generality because it was revised following the second study and because the transference of the categories between the studies was high. Future studies are nevertheless needed to be able to further refine the theory and to be able to draw safer conclusions about the absolute generality of the theory.

6.4.3 Inter-rater agreement

In addition to investigating the generalisability of the model, this study was also conducted to assess whether there is agreement between the ways individuals view this phenomenon. A high agreement would positively contribute to the reliability of the theory.

The transcripts were categorised by the coder/analyst, as a function of the theory. Each categorised extract was then compared to the corresponding labels of one of the three external raters. Measures of agreement were calculated for this crosstabulation. On the basis of these indices, it could be concluded that there was a high agreement between the theory and the judges' categories. That is, the categories produced by the TPA predicted the outcome of the modal category of the external validator at above chance level. The semantics of the theory-based and the modal categories were compared and these also matched each other.

There are two issues here that need to be taken up. First, on average 32% of the total number of categories were assigned to the 'no-code' category. That is, the judges missed or ignored nearly one third of the extracts or parts of extracts that were judged as being associated with aspects of the TPA by the coder/analyst. Despite this relatively high proportion of misses, the value of the agreement ratings does not have to be decreased. As discussed in Section 6.3, this is simply because the present study has been concerned with

comparing theories that are at different stages of evolution. The basis of the comparison is a 'mature' theory, which has been developed in the course of a number of months and two studies. The judges, in comparison, spent relatively little time in studying the transcripts and constructing the categories. It is therefore only natural that they did not identify all of the issues that are relevant in regard to the process of personalisation. Consistent with this notion, the judges consistently missed some of the more abstract concepts. For instance, no categories existed in the judges' models that would have corresponded to the categories Ownership of System, Effectiveness of Personalisation Items, or SEC.

To overcome these maturational differences, it could be argued that it is actually more viable to base the agreement ratings only on the extracts that the judges had categorised. As illustrated in the results section, this leads to a marked improvement in the association levels.

Another aspect that can be overcome by referring to these maturational differences is the fact that the number of categories that the judges produced for each transcript was only about half of the number of the categories that were produced by the coder/analyst. It can be expected that a theory, which has been allowed to mature has become more refined in that subcategories have been constructed to further elaborate on given concepts. To illustrate this with the present study, the judges sometimes only referred to aspects related to identity expression with one single category. In contrast, the theory of personalisation may refer to the same extract with one of the following categories: Reflection of Personal Identity, Distinction, Duality, Mass-Market, Self-presentation, or Fashion.

6.4.3 Evolution of the research

The TPA was modified as a result of this study. It could be argued that this has resulted in the theory becoming more general, as it now covers the personalisation of mobile phones and portals, across Finnish teenagers and UK-based university students. A logical step in the process of increasing the generality of the TPA would be to investigate yet another device and user population. A context that remains unexplored is the personalisation of home computers. The latest versions of Windows and Mac OSs provide the user with great flexibility in personalising the desktop. Especially when used at home, where the socio-emotional context of use is likely to be more present than with the office computer, these devices could be expected to be associated with extensive personalisation.

The TPA has also reached such maturity, that one could include in the next study an attempt to test whether the theory corresponds to real personalisation behaviour. One way of doing this would be to adopt a heterogeneous sample of participants and see if the differences in the dispositions fulfilled between these users would result in differences in the extent to which these individuals personalise their computers.

Chapter 7. Home Computer study

7.1 Introduction

The Two-stage study investigated personalisation of appearance of portals among university students. This led to the construction of the original TPA. In the Finnish study the focus was on mobile phone personalisation from the point of view of teenagers. Three processes were undertaken to assess and improve the general applicability and reliability of the theory. First, the theory was revised in the light of the new data, thus improving the generality of the theory. Second, the transference of the categories between the two studies was assessed and found to be high. The original theory explained the comments relevant to personalisation for the novel user group and device relatively well. Third, external judges, who were naïve to the theory, were asked to categorise the transcripts of the Finnish study. There was a high association between the judges' categories and those generated by the coder/analyst, indicating high inter-rater agreement regarding the TPA.

A second follow-up study was performed on yet another context of personalisation to increase the maturity of the theory. The focus was shifted to personalisation of appearance of the desktop of home computers. This is a well-developed area of personalisation in terms of features available for personalisation. The most recent versions of Microsoft and Mac operating systems include a variety of personalisation options, ranging from colour changes to the background of the desktop, to selecting desktop themes. In addition to the operating systems being equipped with a range of personalisation possibilities, there is a wealth of web sites dedicated for downloading desktop personalisation items onto one's computer. These sites allow the user to download screen savers, wallpapers, icons and desktop themes. An indication of the popularity of these sites is their frequency. The figure below illustrates a screenshot of desktopsunlimited.com, providing links to sites offering this personalisation service.

Figure 7.1. The number of links to sites dedicated for downloading desktop personalisation items, as presented on www.desktopsunlimited.com, provides an indication of the popularity of this phenomenon.

The extent to which the desktop of a computer can be personalised is large, including visual and acoustic modalities. The screen size in computer displays is much larger than that of, say, mobile phones, which implies that personalisation of the desktop is likely to be noticeable and visual. Many different kinds of personalisation items can be used, thanks to the web-based services discussed previously. The user is also provided with the chance to acquire an active role when personalising the desktop, by using personal photos to decorate the desktop with.

The large selection of personalisation items contributes to the dispositional category Effectiveness of Personalisation Items, which makes this context a natural choice when selecting a system to be further studied. Also, the focus of the study was the home computer, a context more likely to be associated with a socio-emotional context of use than the work computer.

The main reason for changing the focus for the Home Computer study was to make the TPA more mature by increasing the generality of the theory. An interesting question was the degree to which the TPA would have to be revised in the light of data stemming from desktop personalisation. If the theory had reached a high degree of generality, it would have been logical to assume that dramatic revisions would not be necessary. GT analysis of the transcripts of the Home Computer interviews took place. The process was made

more practical, however, by only transcribing the comments which were relevant to the process of personalisation of appearance.

Another objective of the Home Computer study was to investigate what personalisation users had actually done, rather than simply record what they said they had done. Providing descriptions of how people personalise was interesting from the point of view of comparing these descriptions with the TPA and investigating whether there were any parallels between real behaviour and the theory. To enable observation of personalisation behaviour, individual interviews were performed in the homes of the participants. The exploratory nature of the study also resulted in acquiring a heterogeneous sample, with the participants varying in terms of their age and profession.

In addition to promoting the exploratory nature of the study, the heterogeneous sample contributed to the third objective of the study, namely an attempt to determine whether there was an association between the Dispositions and Personalisation Behaviour, a dynamics inherent to the TPA. Investigating a range of different users was hoped to lead to variance in the Dispositions. Personalisation Behaviour regarding each participant was determined by recording aspects of personalisation that indicated the Extent and Frequency of Personalisation. The present study could be seen as an initial attempt to investigate whether elements in the TPA correlate with each other. This issue was examined more systematically in Part 3 of the thesis.

In summary, the Home Computer study aimed to increase the generality of the TPA by expanding it to the context of home computer desktop personalisation. To investigate personalisation habits of the participants, individual interviews were performed in the homes of the participants. An initial attempt was also made to determine whether the degree to which the dispositional factors were satisfied correlated with Personalisation Behaviour.

7.2 Method

The method section consists of three sections: participants, interviews and the analysis of the data.

7.2.1 Participants

Eight PC users were interviewed in their homes. The participants lived in York and they were acquired through a recruiting agency. An equal number of males and females was requested and the participants had to use the Internet at home for an average of at least two hours a week. At least 25% of this usage had to be eCommerce and surfing related, i.e., not email or chat. The participants had to own a mobile phone. In summary, the aim was to acquire a sample of leisure-based computer users. Internet usage motivation and amount of time the participants spent surfing the web varied, however. One participant used the Internet only occasionally for email and banking, whereas another participant browsed the web for several hours a day for entertainment-related purposes.

The sample was older and had more varied occupations than the Two-stage and Finnish studies. Table 7.1 describes the participants of the Home Computer study. These details were acquired using a questionnaire that was filled in by the participants following the interviews (see Appendix 11 for the questionnaire).

Participant (male/female)	Age	Occupation	Main area of computer use	Main area of web use	Shopping through the web
H.L. (f)	25 – 34	Student	Word-processing	Work	Clothes, games, CDs, books
R.T (m)	45 – 54	Manager	Surfing and games	N/A	N/A
J.Ma (m)	18 – 24	Process operative	Chat and games	Finance, entertainment	Has not done shopping
W.H. (f)	25 – 34	Accounts manager	Email and surfing	Shopping	Clothes, jewellery, CDs, books, pictures
T.S. (m)	45 – 54	Driver	Email	Finance	Books, CDs, clothes
J.M. (f)	35 – 44	Lab technician	Surfing	Entertainment	Books, CDs, holidays
S.R. (m)	45 – 54	Manager	Surfing	Entertainment	Tickets, holidays, PC parts
I.C. (m)	45 – 54	Teacher	Surfing and word-processing	Entertainment	CDs, holidays, wine, shoes, hotel rooms

Table 7.1. Participant details in the Home Computer study. The participants represented a wide range of ages and professions.

7.2.2 Interviews

The interviews lasted about 90 minutes each and they were conducted in the homes of the participants. The author's academic supervisor accompanied the author in these home interviews. The author facilitated the interviews and they started with open-ended general questions about who in the home used the computer. The discussants were then asked to switch on the computer and demonstrate the ways in which their PCs had been personalised. The facilitator also demonstrated personalisation features of the Yahoo! web portal to generate further discussion. To generate contrasting discussion between desktop and mobile phone personalisation, the participants were also asked to show how they had personalised their mobile phones. At the end of the sessions, the participants filled in a short questionnaire regarding computer use and personalisation. See Appendix 12 for the interview protocol.

7.2.3 Analysis

In contrast to the previous stages of the qualitative research the sessions were not fully transcribed. Instead, a table containing information regarding the personalisation and computer usage habits was filled in for each participant. The table was complemented with memo-writing. In addition to observing behavioural patterns, comments that were concerned with the user implications of personalisation were transcribed. TPA was used to categorise these transcripts. Segments, which were not covered by the theory and were relevant to personalisation of appearance, were highlighted and further analysed using GTA.

7.3 Results

Section 7.3.1 is concerned with describing the changes that were made to the TPA in the light of the new data. The participants' personalisation behaviour is described in 7.3.2 and section 7.3.3 describes the association between the dispositional factors and Personalisation Behaviour.

7.3.1 Refining the TPA

Most of the content of the interviews that was relevant to the process of personalisation of appearance could be labelled using the TPA categories. There were only six extracts that were relevant to the personalisation process that could not be accounted for. One category was created to describe these extracts: *New to System*. This category was included in the dispositional super-category User. Half of the participants stated that they personalised the desktop when the computer was new. Personalisation took place at this point because of the novelty of owning a new computer:

> First thing it was a novelty [personalisation] so you I kept doing it every couple of weeks. But now it's not a novelty, it's a pain at times. So now I don't do it as much.

This initial personalisation also provided the users with a chance to explore the novel system.

> When I first got the computer, I used to fiddle about with the appearance all the time ...Get acquainted a bit.

This kind of exploratory use may be particularly important for novice users as it could lead to a higher level of confidence in system use. In line with this, is a comment made by J.M., who was a beginner in using computers:

> Messing about and changing them [screensaver, wallpaper, and other items] will give you more experience and more confidence to do different things I suppose.

Someone might argue that the kind of dynamics this category implies threatens the rest of the theory – perhaps personalisation is only relevant when the product is new. However, this was not the case. The participants that personalised did so even after progressing beyond the initial usage stage. The category New to System merely identifies a point in time when one is especially likely to personalise.

7.3.2 Personalisation behaviour

There was considerable variation in the extent to which the participants had personalised the desktops of their computer. A few had never personalised their machines, whereas others were relatively frequent personalisers having, for example, book-marked web sites from which they would download desktop themes. The last two columns from the right in Table 7.2 illustrate the Extent and Frequency to which each participant had personalised their computer. Both of these could be regarded as aspects of Personalisation Behaviour in the TPA. Columns 2, 3 and 4 show the extent to which the participants fulfilled the dispositional categories Knowledge of Personalisation, SEC and Ownership of System. Column 5 shows a dispositional index for each user. This was calculated by averaging across the three individual Dispositions. The Dispositions, as well as the aspects of Personalisation Behaviour, were acquired for each participant using the interview data.

Interestingly, the table shows that the ones personalising the most seem to be motivated by leisure aspects, and that they tend to be the main users of their computers. In contrast, the ones not personalising are more likely to be motivated by work and they do not tend to be the main users of their PCs. These observations will be further discussed in section 7.3.3. The present section, on the other hand, provides a more detailed description of the personalisation habits of the participants.

Participant	Know-ledge of Pers. (1)	SEC (2)	Ownership of System (3)	Dispo-sitional index (4)	Extent of Personalisation	Frequency of Perso-nalisation (5)
S.R.	3	5	3	3.7	Custom and downloaded themes, wallpapers and screensavers. Recorded sounds.	3
R.T.	3	5	3	3.7	Custom and downloaded themes, wallpapers and screensavers. Custom and downloaded sounds.	3
J.Ma.	3	4	2	3.0	Screen resolution.	2
H.L.	2	2	3	2.3	Custom and downloaded themes, wallpapers and screensavers.	2
W.H.	2	3	2	2.3	Custom screensaver and wallpaper.	2
J.M.	1	4	1	2.0	No	1
I.C.	2	2	1	1.7	No	1
T.S.	1	3	1	1.7	No	1

(1) 1 = novice. 2 = intermediate, 3 = expert
(2) 1 = task-based motivation and/or no leisure-based functions in the device; 5 = socio-emotional motivation and respective functionality (e.g. email, games, Internet access) in the device
(3) 1 = participant is not the owner or the main user; 2 = participant feels some ownership; 3 = participant has full ownership
(4) dispositional index (average of three previous columns), see discussion below
(5) 1 = never; 2 = occasionally; 3 = Once a month or more

Table 7.2. Personalisation information regarding the participants.

Table 7.2 indicates that three distinct groups can be identified as a function of the Extent and Frequency of Personalisation. S.R. and R.T. utilised the whole range of personalisation features and were frequent personalisers. J.Ma, H.L. and W.H. were occasional personalisers and only one of them (H.L.) utilised effectively the range of the possible personalisation features. Finally, J.M., I.C. and T.S. had never personalised their PCs. These groups could be referred to as Extensive Personalisers, Occasional Personalisers, and No Personalisation, respectively.

It seems reasonable to individually discuss the personalisation behaviour of each of these groups, in separate sub-sections. Personalisation will be discussed in the light of three factors: computer usage, personalisation habits, and perceptions toward personalisation.

7.3.2.1 No personalisation - group

Three participants never personalised their desktops: T.S., I.C., and J.M.

Computer usage

A commonality between all three users in this group is that none of them was the main user of their home computers. Consequently, it is likely that these individuals did not perceive ownership of their computers. T.S. and I.C. could be both categorised as possessing a work-based motivation to use the computer. The former mainly used the computer for checking his email or to do online banking. The latter stated that he viewed the computer strictly as a tool. J.M. was the only person in this group who used the computer mainly for leisure purposes. She was interested in browsing entertainment-related web pages. None of the three participants were IT experts. J.M. was a novice user at the time of the interviews and I.C. and T.S. could have been categorised as intermediate users. All three used the computer 2 – 3 times a week.

Personalisation habits

T.S. had never personalised any aspect of the desktop of the home computer. I.C. had not done any personalisation in a while, which was partly explained by the fact that the son of the family personalised the desktop with car-related wallpapers. I.C. had, however, changed the wallpaper a few times, during the first month or so of using the computer. This was done to accommodate the work-related aspects of using the system:

> I'm a more practical user of the computer. It doesn't bother me what the background is, as long as it's reasonably relaxing. The clouds [one of the custom wallpaper options on Windows 95] were fine with me.

I.C. stated that the family members used to have their own accounts, which allowed each of them to personalise the computer such that it would not affect the others. These

individual accounts had later merged into one account, with the wife and I.C. himself having to put up with the son's personalisation.

Perceptions toward personalisation

Neither T.S. nor I.C. were interested in personalising their computers, as they both saw the computer as a tool. T.S. said that he did not know how to accomplish this process in the first place. While I.C. did not see any value in personalisation, he recognised the possibility of using a personalised object to represent aspects of one's identity. Importantly, he referred to the possibility of using an object to present oneself to others. He drew a contrast between cars that can be seen by others and one's computer, which is in private use:

> If you're personalising a car it's a statement that people can see all over the place; if you personalise your computer, by and large, there's only you looking at it, unless you have a bigger family... I cannot see with computers, between four walls, there's only you in it looking at it.

As compared to the attitudes of I.C. and T.S., J.M. seemed to have a more positive view of personalisation. Importantly, she perceived it as a possible means to get more confident with using the computer.

7.3.2.2 Occasional personaliser – group

W.H., H.L. and J.Ma were categorised as occasional personalisers.

Computer usage

H.L. and W.H. had intermediate computing skills, whereas J.Ma was an expert user. Individuals in this group were more experienced at using the computer than the ones in the previous group: all of the participants had been using a computer either at home or at work for a number of years. J.Ma was the one most motivated by leisure aspects. He used the PC for games, chat, and online banking. H.L. was finishing her university course at the

time of the interview, which explains the fact that she mainly used the computer for her course work. W.H., on the other hand, was mainly interested in doing online banking and shopping with her computer. All three were either the main user or one of the main users of the computer.

Personalisation habits

W.H. was the one who had personalised her computer to the least degree. She had changed the screensaver and the wallpaper a few times, when the computer was new. Her husband was the one usually initiating the changes. Interestingly, the changes were mainly made to entertain the family's children. H.L. had more knowledge of personalisation. She had downloaded desktop themes a few times and could also scan photos and make screensavers of these. She personalised quite rarely, however. When J.Ma first got the computer he was a frequent personaliser. Over time, he started to "prefer the basic layout where you got everything you want at hand". J.Ma has now resorted to the default Windows 2000 theme.

Perceptions toward personalisation

W.H. was not very interested in making changes to the appearance of her computer. The ability to do so would "not sway her from one computer to another". A factor that prevented her from personalising more extensively was that she did not feel very confident with computers. She would thus need her husband to show her how to make the changes.

J.Ma was not that interested in personalisation either. His context of use had shifted from leisure-based to work-based: he valued ease of use and easy access to the software and information he was using. There were three reasons for this shift. First, he had not had much extra time recently due to the hours he was spending at work. Therefore, he did not get to "sit and play" as much as he had used to. Second, he did not consider this process a novelty any more. Third, there was a technical reason. J.Ma had been forced to format the C-drive because the extensive personalisation had affected the configurations of the operating system. He did not want this to happen again. J.Ma stated, however, that he could see himself personalising again in the future when would move to his own place and get his own computer.

Of the three persons in this group, H.L. was the one most interested in personalisation. She did it to counterbalance the work aspects associated with the computer use. Moreover, personalisation for H.L. made the computer "feel less like a task". When personalising the desktop:

> You maybe looking at a computer but you're not, you're looking at a picture. You can be staring at a computer all day but it's just nice to have something nice to look at, something interesting to look at. Like a window.

H.L. associated feelings of fun to this process; she perceived personalisation as play. This is why to H.L, a personalised mobile was "more like a toy than an actual phone". She had also made attempts to personalise her work computer. She was annoyed with the range of custom items available on that machine because "the default ones are absolutely rubbish, they are so boring".

7.3.2.3 Extensive personalisation – group

Two participants were found to be doing extensive and frequent changes to their computers: R.T. and S.R.

Computer usage

Both R.T. and S.R. were expert computer users. They had several years' experience in using the computer and they were both the main users of their home PCs. S.R. and R.T. were using the computer every night for several hours and both admitted that they were using their computers purely for leisure purposes. As R.T. put it, for him the computer was "purely for stress-release". For S.R., computer use was "no business at all". The main usage areas for both users included gaming and browsing. They also downloaded music files and other free software.

Personalisation habits

R.T. was an extensive personaliser. The time he would usually keep a particular choice, such as wallpaper, varied between days and a few months. He was not happy with the default choices provided by Windows Millennium and constantly visited web sites that contained alternative personalisation items. According to R.T., on these sites "you can have a [desktop] theme for literally anything you want, from cowboys to car tunes to anything". R.T. used audio as well as visual personalisation items.

R.T. happened to be a personal friend of S.R. and characterised his personalisation habits as follows:

> [He] changes it every week. He is obsessed with it. He changes it religiously. Probably once a week. Every time I've been there he has something different. Last time I was there he had the 'Royle family' on. He changes his, Christmas, birthdays, anytime: it's always been changed.

S.R. had been engaged in this activity since it was first possible, i.e., since the launch of Windows 95 operating system. He dominated the personalisation of the desktop of his home computer. For instance, when his daughters personalised the desktop, he immediately retrieved his personal personalisation settings. Like R.T., S.R. was also interested in personalising the sounds of the computer. He even incorporated personally recorded sounds.

Perceptions toward personalisation

The fact that R.T. liked to use sounds in addition to visual items to personalise the desktop of the computer suggests that he had a need for a multi-modal personalisation. He wanted to accomplish this process as fully as possible. It was not surprising, therefore, that he expressed a wish for animation to be included as one of the personalisation modalities. Personalisation was an important aspect of computer usage for R.T. He reacted strongly when asked how he would feel if the next Windows operating system did not include an option to personalise:

> I would not like it that way. I'd like to be able to do things as I want. The one at work is Windows 95 and it is so boring so I had to do something with it to brighten it up a bit. I would not like to think that they were taking that away ... I would not like to think that they would go back to say: this is what you will keep.

When it comes to personalising his mobile R.T. stated that he had not made many changes to it. When asked why, he replied:

> That to me is not as personalised as other things because it's just a tool. But even then I have to put something on it. Cause I cannot have it standard. I think it's an obsession with human beings.

Also S.R. regarded personalisation as an important process. He compared the personalisation of a computer to changing the appearance of a car, for which he was too old. The fact that his children sometimes personalised the computer had made him want to get a separate computer for them:

> ... I know my wife doesn't use it, I know the kids do, but this is mine to me. This is my toy. Like the car used to be, but it ain't any more, cause everybody drives it. My wife drives it. It's not as personal as this is. That's why I need another one so I can have this to myself.

In addition to having positive attitudes toward his personalised computer, S.R. liked the actual process of personalisation. He "could spend a good hour personalising" the computer because the process was so enjoyable: "...watching it download it and looking as well. Cos you don't know what the sounds are like".

A general summary regarding the descriptions associated with the three personalisation groups discussed above is that the more frequently the participant personalised, the more important this process seemed to be for the participant. The opinions among the frequent personalisers were emotionally enriched and the comments were often associated with the Emotional and Social Effects from the TPA. Consistent with the TPA, only the frequent personalisers used the computer solely for leisure-purposes. Participants accomplishing this process less frequently were characterised as work-based users and they were not as

competent at using the computer. The next section will further examine these interesting associations.

7.3.3. Examining the association between Dispositions and Behaviour

The previous section described a range of personalisation behaviours and attitudes. Some of the participants had never personalised their desktops, whereas others were experts; some did not regard personalisation as an important aspect of using their computers, whereas for others, the ability to personalise seemed essential.

The findings presented in the previous section, and summarised in Table 7.2, allowed the investigation of the basic dynamics of the TPA: namely the notion of Dispositions leading to Behaviour. In line with the TPA, the participants scoring high on the individual Dispositions (Knowledge of Personalisation, SEC and Ownership of System, listed in Columns 2, 3 and 4 of Table 7.2, respectively) were in the Extensive Personaliser group. The dispositional values tended to decrease for the participants in the Occasional Personaliser and No Personalisation groups.

The dispositional index was displayed in column 5 of Table 7.2. This was the average of the previous three columns including the individual Dispositions. The index predicted the Frequency and Extent of Personalisation, shown in the last two columns of Table 7.2, respectively, for each of the groups, thus providing additional support to the theory. S.R. and R.T., participants from the Extensive Personaliser group, scored highest on the dispositional index and J.M., I.C. and T.S, the ones who had never personalised, scored lowest on the index. Furthermore, there was no overlap in the scores of the individuals between the groups.

This led to two conclusions. First, the association supported the notion of the dispositional factors influencing Personalisation Behaviour. Second, it pointed to the feasibility of systematically investigating the correlation of the elements in the TPA using quantitative methods, an approach taken later in Part 3.

7.4 Discussion

The discussion consists of five sections. 7.4.1 discusses the Home Computer study and aims to draw conclusions from it. Section 7.4.2 re-examines the TPA in the light of the three studies that have been described in Chapters 5-7. Section 7.4.3 aims to relate the TPA to an existing body of knowledge and Section 7.4.4 is associated with listing the advantages and limitations of the research methodology that has been used in the qualitative part of the thesis. Finally, the evolution of the research, as we progress to Part 3, is discussed in 7.4.5.

7.4.1 Home Computer study discussion

The Home Computer study had three objectives. First, it aimed to refine the theory by introducing a novel context of personalisation. Second, of interest was also how do people actually personalise their devices. Third, an initial attempt was made to look at whether the TPA can be used to predict behaviour related to personalisation.

When it comes to the first objective, adding a category 'New to System' to the super-category User Disposition refined the theory. It was found that having just acquired the device is a point in time when one is especially likely to personalise it. This type of personalisation was associated with the users regarding the system as a novelty, and wanting to explore it by changing the way it looks. The possibility of personalisation in the initial stages of system usage being beneficial for a novice user's confidence was also discussed. This issue should be further investigated as it may alleviate the problem of novice users lacking the confidence to use the system.

The need to revise the TPA by adding just one category suggests that the theory has reached a respectable level of generality. We might detect an evolution toward increased generality of the TPA between the studies. The Two-stage study resulted in a theory with 18 main categories. The Finnish study was the first follow-up stage. It required the theory to be revised by adding six categories. The Home Computer study, on the other hand, resulted in the addition of only one category. The decrease in the revision need with each new follow-up study points toward the theory having reached maturity and generality. A factor supporting this idea is that the main structure of the theory, i.e., describing personalisation with the help of Dispositions and Effects, is unchanged. The structure has

provided a solid and scalable framework for assessing the user experience associated with personalisation of appearance.

The Home Computer study also investigated how people personalise their computers. The study suggested that users personalise their home computers, to varying degrees. Three patterns of personalisation were identified: Extensive Personalisers, Occasional Personalisers and those who never personalised their computers. Interestingly, the Extensive Personalisers made personalisation of the system more pervasive by using multiple modalities. Both users in this group, in addition to changing the visual appearance of the computer, changed the sounds of the operating system. A wish was also expressed to expand personalisation to cover animated features.

Personalisation was associated with different kinds of implications for each personalisation group. The opinions among the Extensive Personalisers were emotionally enriched and were often associated with the Emotional and Social Effects of the TPA. Participants personalising less extensively, on the other hand, were not as competent at using the computer, and their computer usage was more work-based than leisure-based.

Investigating how the users personalised their computers could be beneficial for future design. The Extensive Personalisers, in particular, provided useful ideas for improving the process of personalisation of appearance. The most prevalent need among these participants was to make the personalisation features more pervasive. The notion of multi-modal personalisation, i.e., using audio as well as visual items, is consistent with this need. The Extensive Personalisers were also keen on incorporating desktop themes. Desktop themes are inherently pervasive, because these imply the use of personalisation items that are stylistically consistent with each other and appear across the system (such as in the screen saver, icons, and wallpaper). The notion of pervasive personalisation should be investigated in the future, because it may enable an emotionally enriched user experience.

Finally, the study aimed to investigate whether the Dispositions in the TPA are associated with Personalisation Behaviour. A positive correlation between these elements was indeed found. The value of this correlational approach should here be seen as formative, however, due to the limited size of the sample. The safe conclusion of the correlational approach is, therefore, that there could be an association between the dispositional factors of the TPA and Behaviour: the higher the degree to which the Dispositions are satisfied, the greater the magnitude of Personalisation Behaviour. Future attempts to systematically test the ability of the theory to predict behaviour may be useful.

Another area of interest is whether Personalisation Behaviour correlates with the magnitude of Effects.

7.4.2 Theory of Personalisation of Appearance: structure, design implications, and research questions

The Two-stage study resulted in the construction of the original TPA. This was refined as a result of two follow-up studies. The present section provides a summary of the theory. The first subsection describes the structure of the theory, the second discusses its design implications and the third concentrates on questions regarding the phenomenon of personalisation that remain unanswered.

7.4.2.1 Structure of the TPA

The three qualitative studies that have been described in chapters 5 – 7 have utilised a variety of methods, user groups, and devices. The TPA that has emerged is summarised in Figure 7.2 below, with all of the main categories listed under each super-category. In this theory, User, System, and Contextual Dispositions influence an individual's likelihood of personalising the appearance of any given electronic product. The greater the extent to which these factors are satisfied, the greater the extent and frequency of personalisation are expected to be. This notion received support in the Home Computer study, in which dispositional factors were found to be associated with behavioural aspects. The 'post-personalisation' aspect of the theory implies that personalisation leads to Cognitive, Social, and Emotional Effects.

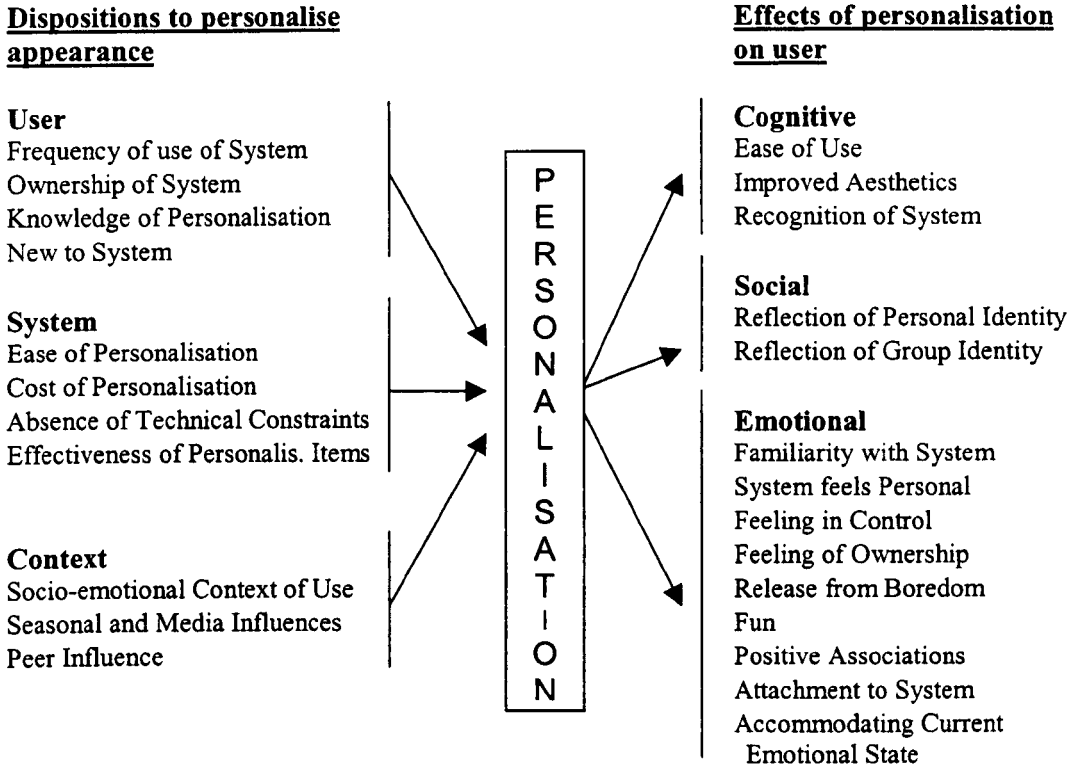

Figure 7.2. Theory of Personalisation of Appearance, after the three studies described in chapters 5 – 7. Note that the subcategories are not included in the figure.

From the point of view of Dispositions, the theory may be useful in providing us with answers as to why certain electronic products are personalised more often than others. For instance, mobile phones could be conceived of as potential devices for this process as they are used often, and importantly, mobile telephony is often associated with a socio-emotional usage context. Televisions, on the other hand, are almost never decorated, which is perhaps mainly explained by the fact that there are no personalisation items available to accomplish this process and because a television is frequently shared by a number of individuals.

The Effects in the theory provide useful insight of the nature of the user experience associated with personalisation of appearance. The issue to emphasise here is that there seems to exist a difference between the Cognitive and the Socio-emotional effects. The former group is associated with task-related aspects of system usage whereas the latter is associated with leisure context.

7.4.2.2 Design implications

A detailed illustration of how the TPA may be used to aid in the design of personalisation features is presented in Chapter 11, in which the theory is used to inform the design of a self-service platform. This section discusses the applicability of the TPA to the design process from a more general point of view.

The most important design implication of the theory is that it may be used to identify whether it is beneficial to incorporate personalisation of appearance in the device. In other words, the TPA may aid the designer in deciding whether or not to include a feature of personalisation of appearance in the system. If there is a high Disposition to personalise a device, then it is recommended that the user is allowed to personalise the appearance of the device. This notion may be facilitated in the design stage of a product by determining how many of the Dispositions listed by the TPA are satisfied, when taking into account the nature of the target user group and usage context.

Table 7.3 presents a checklist, based on the Dispositions, to determine how likely it is that users will want to personalise a system or product. If one can answer "yes" to a large proportion of the questions then the prediction will be that there is a user need for these kinds of features. To assist the designer to determine whether the Disposition identified for the device is high or low, it may be useful to compare the dispositional levels of different devices and contexts. To illustrate this, Table 7.3 applies this checklist to two hypothetical examples: mobile phone aimed at teenage users and desktop of a computer used at work. For the purposes of this illustration, assume that the marketing department has provided the data on these two groups.

	Mobile phone aimed at teenagers	Desktop of a computer used at work
1. Will the system or product be used frequently by the user?	Yes, every day.	Yes, five days a week.
2. Will the user own the system or product?	Yes.	No, employer owns the computer.
3. Will the user know about the ability to personalise and does she know how to personalise?	Yes, the process is well-known.	Yes, the process is well-known.
4. Has the user acquired the product recently? I.e., is the product new to her?	Yes, a new phone is acquired once a year.	No, a new computer is only acquired once every four years.
5. Will it be easy to use these features?	Yes.	Yes.
6. Will the cost of personalisation be reasonable to the user?	Yes, most personalisation items are reasonably priced.	Yes, most personalisation items are free.
7. Are the technical constraints absent for personalising the product?	Yes.	Yes.
8. Will the features provide the user with enough attractive options?	Yes, there are plenty of items available.	Yes, there are plenty of items available.
9. Will the context of use be of social and emotional value to the user?	Yes, the phone is used to communicate with friends.	No, the computer is strictly work-based.
10. Are there seasonal or media themes included in the personalisation features?	Yes, the operator advertises seasonal graphics and ringing tones.	No.
11. Will there be peer pressure to use these features?	Yes, personalisation is discussed among friends and personalisation items are actively exchanged.	No.

Table 7.3. A checklist to determine how likely it is that users will want to personalise a system or product.

The table indicates that, in this hypothetical case, mobile phones, when aimed at teenage users, facilitate the TPA Dispositions to a greater extent than does the desktop of a computer used at work. This points toward the importance of including a feature of personalisation of appearance to a mobile phone model aimed for this particular user group.

This approach may also be used in a negative sense. If any given technology scores low on the dispositional questions listed in the previous table, and the ability to personalise the appearance of the device is desired, then it may be possible to design the product and its marketing campaign such that the Dispositions not originally fulfilled become satisfied. For instance, if one was to facilitate the category Seasonal and Media Influences in the context of work-based desktop referred to in Table 7.3, one could market seasonal desktop themes prior to the respective bank holidays.

The Effects listed in TPA could be used to convince the managerial level of the company producing the product to be personalised that this feature is recommended in the first place. All of the Effects could be regarded as desirable. For instance, Ease of Use, Feeling in Control, and Reflecting Personal Identity are all Effects one would want to associate with the use of a product.

It is likely that personalisation items vary in terms the Effects they elicit. It may, for instance, be the case that the use of photographic material allows identity expression. Which particular personalisation items lead to which particular Effects, is a question currently not covered by the TPA. Although the TPA does not answer this question, an experienced designer may nevertheless have an understanding of the associations between various personalisation items and Effects.

7.4.2.3 Research questions

At the present point of research, one could conclude that the TPA opens up more questions than it answers. This is not a negative issue, however. Rather, it points toward the idea of the TPA providing us with a fruitful and active research area. The below discussion explores issues that are in need of future research.

One question is whether a positive feedback loop could arise, such that the Effects on the user could reinforce the Dispositions to personalise leading to further personalisation, further Effects and so on. For instance, ownership appears as both a Disposition and as an Effect. It is thus conceivable that the process of personalisation would elicit a Feeling of Ownership in the user, which in turn would influence Ownership of System, a dispositional factor. The possibility of this kind of positive feedback seems highly plausible and detailed longitudinal studies of personalisation could yield interesting data on this point.

Another question is to what extent the Dispositions are specific to particular user groups and devices. When comparing the Finnish mobile phone groups with the Two-stage study there were Dispositions and Effects appearing in one that did not appear in the other, and vice versa. At the very least this suggests that the device and user group affect the relative weights of some categories. For example, Reflection of Group Identity and Attachment to System or Product may be more salient to Finnish teenagers than UK students. Ease of

achieving personalisation may be more salient in computers than mobile phones. These issues can only really be resolved with large formally sampled surveys.

If Dispositions are affected by the user group and device studied, the TPA would acquire an interesting extra dimension, namely the idea of user and device specificity. Another potential dimension that is presently not covered by theory is associated with the category 'New to System', which points toward time contributing to the way personalisation should be defined. Not only does the notion of time emphasise personalisation when the system is new. It also highlights the idea of personalisation taking place on different time scales. An example of transient, shorter time scale personalisation is provided by the category Seasonal and Media Influences. Personalisation to express identity, on the other hand, may require a longer time scale, as the user could stick to a particular graphic for a period of a few months. This line of thinking adds an interesting dynamics to the TPA and may result in having to refine the theory in the future.

Finally, investigations into the nature of the category Improved Aesthetics provide a challenging avenue for future research. This Effect is regarded in the theory in a rather unorthodox way, as a Cognitive one. Does the casting of Increased Aesthetics as a Cognitive Effect imply that the appearance of the interface places demands on the cognitive resources of the user? Consequently, personalising the appearance of, say, the desktop, might result in the interface becoming easier on the eye, i.e., less loading on the cognitive resources of the user? Conversely, could it be the case that despite a user's perception of the aesthetics of the system increasing as a result of the personalisation process, the system would actually become more loading than before due to, for instance, the icons becoming less noticeable? In any case, associating aesthetics with cognitive aspects of system usage implies that the aesthetics of the system competes with other more functional features, such as the amount of information presented on the screen, for the cognitive resources of the user. This notion, in turn, opens up interesting issues for research.

7.4.3 Relating TPA to existing literature

As discussed in Chapter 1, there has been little previous research on the psychological implications of electronic products. The closest parallels can be found from the area of

environmental psychology. Two areas emerge in this literature, which overlap with the TPA: (1) personalisation of office spaces (Wells, 2000) and (2) personalisation of environment (Heidmets, 1994).

The findings in the first area are in line with the category Positive Associations, and the more generic issue of personalisation being associated with emotional consequences in the TPA. Wells (2000) investigated office personalisation with the help of surveys and interviews and found that personalisation and satisfaction with physical work environment correlated positively. She states, however, that it is difficult to identify a cause and effect relationship between personalisation and satisfaction. It may be that workplaces that allow personalisation differ in other positive aspects from those not allowing personalisation. The causal link between controlling one's environment, inherent for the process of personalisation of appearance, and positive emotional responses was examined by Rodin (1986). Elderly nursing home residents were encouraged to make more choices and have more control of day-to-day events. The group given more control became more alert and active and reported feeling happier than the low-control group.

It could be argued that the findings established by Wells (2000) and supported by Rodin (1986) are concerned with a rather narrow area of the TPA. The second area in the literature that overlaps with our theory, personalisation of environment, constitutes a broader theoretical framework and is hence more interesting. Heidmets's (1994) work forms the basis of this area; he argues that personalisation mainly takes place to control the environment and is accompanied by an individualisation of the environment by which the subject's own self is displayed in externalised form. These conclusions thus correspond to Feeling in Control and Reflection of Personal Identity in our theory.

Heidmets (1994) proposes a Theory of Personalisation of Environment in which he aims to explain the need of an individual to shape her environment. He argues that conventionally, studies in environmental psychology have provided a description of two ways in which man structures his surroundings: by territoriality and environmental personalisation. The central issue in territoriality is that man registers some sort of space, determines the norms and behaviour in it, and exercises some sort of *control* over it. In addition to gaining control, the demarcation of the environment could also take place so as to maximise one's freedom of choice: the closer the territory to a person, the more she is able to act freely within it at her own discretion. Environmental personalisation, on the other hand, would imply the materialisation of one's own individuality, a way to display oneself through the environment.

Heidmets proposes that territoriality and environmental personalisation are merely different aspects of the same phenomenon, "*...the phenomenon by which a social subject incorporates a specific sphere from the surrounding environment into the system in which that subject functions*". Importantly, "*...the incorporation takes place by means of control of the environment and through regulation of the activity and interrelations happening in it (the aspect of territoriality), and is accompanied by a specific individualisation of the environment by which the subject's own self is displayed in externalised form*" (p.57). He coins this integrated framework the personalisation of the environment.

Heidmets makes a distinction between the sphere of the surrounding environment and the system in which the individual herself operates. This refers to the notion of territoriality – to the distinction between self and others. It is important to acknowledge that the sphere within which one operates consists of several zones, which vary in importance. In line with this, Altman (1975) refers to the existence of three basic types of territories: primary, secondary and public territories.

Primary territories are owned exclusively by the individual. In such territories the identity of the owner is salient and they are clearly identified as belonging to a certain individual by others. Primary territories are important as boundary-regulation processes and illustrate the close linkage of privacy regulation, territorial mechanisms and self-identity. Secondary territories are less central, pervasive and exclusive than primary territories. According to Heidmets (1994), "they are often used temporarily or periodically and control over them is partial but they are nevertheless felt to be "one's own". Example of such is one's workbench at work". Public territories have a temporary quality, and almost anyone has free access – parks, streets, and playgrounds are examples of these.

The above implies that objects and places in our environment vary in terms of the territorial significance attributed to them. Consequently, one could assume that the need to shape an object or a place varies. We can now understand the central message of Heidmets. He seems to advocate a view whereby an individual has a need to shape her environment. He coins this Personalisation of Environment, and claims it serves two functions, gaining control over one's 'territory' and expressing one's identity, both to self and to others. Finally, in line with Altman (1975), the environment – and hence objects in it – upon which one feels a need to operate can vary in its importance, from primary territory to public territory.

Crucially, we could impose the Personalisation of Environment framework on the man-machine system. In other words, an individual may have a need to include a device or a

system into her own sphere of control, which in turn would take place by personalising this. As a consequence, the feeling of control over this object would increase and one could use it to reflect identity. The overlap of this dynamics with the TPA is striking: Altman's ideas on territoriality are in line with the category Ownership of System in that this feeling would increase when the status of an object moves from public to secondary to primary territory. Moreover Heidmets's Personalisation of Environment is consistent with the categories Feeling in Control, System Feels Personal, and Reflection of Personal and Group Identity.

Perhaps the most pronounced parallel between Personalisation of Environment and TPA, however, is that their generic aspects are by and larger the same. In both cases, the frameworks are concerned with observing the relationship between an individual and an object. The need of the individual to shape the object varies as a function of various aspects (dispositions in the TPA and perceived territorial significance in Personalisation of Environment), and the process of shaping the object has consequences on the person. Simultaneously, Heidmets's theory is more general in that it aims to explain our universal need to shape artefacts around us. The TPA, in contrast, focuses on a particular class of modifiable artefacts, namely electronic products.

One could argue that the high degree of overlap between Heidmets's and our work contributes to the reliability of the generic structure of the TPA. Moreover it also suggests that the notions of ownership, control, and reflection of identity are integral aspects of the TPA linking personalisation of electronic products to universal behaviour that man exerts over his environment.

7.4.4 Research methodology: advantages and limitations

The two-stage method that was utilised to produce the two theories discussed in Chapters 4 – 7 provided a useful approach to investigating personalisation. Most of the participants had had no previous experience in using a recommender system and hence Session 1, which acquainted the users with the concept of personalised recommendations, was of particular importance. Personalisation of appearance was a more familiar process to the participants and here the importance of Session 1 was based on being able to contrast Excite to more effective contexts of personalisation of appearance, such as that of mobile phones. This stage was of importance also because it acquainted the participants

with the features of interest in a more constructive way as compared to merely referring to these technologies during the actual discussion group. The participants were asked to interact with the features in their own free time, which further contributed to becoming acquainted with the personalisation features.

A possible methodological limitation associated with the Two-stage study and the two follow-up studies was that the author acted as both the facilitator of the discussion groups and as the coder/analyst. There is a danger that the preconceptions of the facilitator influenced the way the participants answered their questions and how the data was coded and analysed. It is possible that the author had "epistemological premises" (Burca & McLoughlin, 1996) that influenced the way he constructed the theory. When researching any given area, there are issues the researcher is likely to be sensitive to and which will consequently influence the analysis. For instance, the "socially related motivations" identified in Blom (2000) perhaps guided the author to look for emotional responses and the expression of identity.

Blumer (1969) refers to the concepts that influence one's research as *sensitising concepts*. For Blumer, this is not a problem, however. He argues that sensitising concepts provide the researcher with a "general sense of reference and guidance in approaching empirical instances". Sensitising concepts thus act as theoretical lenses to help the researcher find examples as well as patterns in the meanings represented in data, using theoretical sampling rather than random sampling (Gephart, 1999).

Blumer's idea of sensitising concepts alleviates the problem of epistemological premises. To further minimise possible influences, external literature was not consulted during the open coding and selective coding stages of the analysis process, i.e., until the theory had become sufficiently developed. The possible preconceptions of the facilitator guiding the discussions, on the other hand, was minimised by using an interview protocol.

An issue that may have further alleviated the influence of the coder/analyst was that GTA was taken a step further by using novel refining methods in the two follow-up studies that resulted in further developing the TPA. Using GTA throughout the follow-up stages, changing the population, the context of personalisation and the interview method in the home computer study were all issues that were likely to minimise the role of possible preconceptions of the investigator.

To conclude, the coder/analyst was aware of the notion of sensitising concepts and attempted to distinguish between these kinds of epistemological premises and preconceptions, which would influence the data analysis in a more negative way. He is

confident that he has provided a summary of how the participants perceived the phenomenon of interest rather than how he saw them and that his previous knowledge has guided the interpretation process rather than taken away the groundedness of the theory.

7.4.5 Evolution of thesis research: from theory to validation

Part 2 of the thesis has been concerned with constructing the theories of personalised recommendations and personalisation of appearance. The latter was further refined with the help of two follow-up studies. Consistent with one of the aims of Part 2, we now have a theory that generates ideas for quantitative experimentation. The first thing to test is whether the theory in its present form is coherent enough a representation of the kind of behaviour it aims to describe. If the theory is found to possess predictive power, then it seems reasonable to explore the theoretical aspects discussed in the section above. If, on the other hand, it is found that the theory is not associated with real life behaviour, another approach to personalisation of appearance should be adopted.

To sum, the theory needs to be quantitatively validated before advancing to further investigating it. A useful way to validate the theory is to investigate its basic structure. Is it possible to show that the Dispositions predict the magnitude of personalisation and does this process lead to Cognitive, Social, and Emotional Effects? Part 3 will focus on investigating these questions. Two studies will be described in which systematic attempts were made to quantitatively assess the structure and predictive power of the theory. The first study involved a questionnaire, which assessed the correlation between the Dispositions, personalisation Behaviour and Effects of personalisation. In the second study, the causal nature of the Behaviour leading to Effects was assessed.

Part 3

Part 3 focuses on quantitatively validating the TPA. Chapters 8 and 9 describe a web-based questionnaire that was performed to investigate whether the Dispositions, Personalisation Behaviour and Effects correlate with each other. An attempt was also made to investigate whether the super-categories grouping the Effects are valid representations of the Effects. Chapter 10 describes Experiment 3, which attempted to test whether Personalisation Behaviour leads to Effects, a dynamics inherent to the TPA. Finally, Chapter 11 summarises and concludes the thesis.

Chapter 8. Factor analytic refinement of the Cognitive, Social and Emotional Effects

8.1 Introduction

The studies presented in Chapters 8 and 9 exploited an opportunity to examine personalisation behaviour. A list of staff members and students at the University of York with personal home pages was obtained and the listed individuals were invited to take part in a questionnaire study. Allowing both staff members and students to take part in the study ensured a heterogeneous sample. The personalisation contexts that were assessed were the home pages of the respondents and the desktops of the computers used by the respondents at the university.

The associations between the top-level constructs Dispositions and Personalisation Behaviour and then between Personalisation Behaviour and Effects will be explored in Chapter 9. In this chapter we will present a factor analysis of the ratings of the Effects from this data collection exercise. The categorisation of Effects to super-categories Cognitive, Social and Emotional within the TPA was based on the judgement of the analyst rather than any data from the informants. A factor analysis provides a data driven way of doing the same thing. Factor analyses of the two areas of personalisation are presented before the correlations between Dispositions, Personalisation Behaviour and Effects so that the clusterings observed can be taken into account in the correlational exercise in the next chapter.

8.2 Method

The main elements of the TPA, Dispositions, Personalisation Behaviour, and Effects, were assessed using a web-based questionnaire. The population was heterogeneous: the respondents were either students or members of staff at the University of York. In addition to acquiring subjective data, the extent to which the respondents had personalised their home pages, an indication of Personalisation Behaviour, was determined objectively by visiting each page. The Effects used in the factor analytic refinement exercise were

consequently effects of actual behaviour in home page personalisation and effects of reported behaviour in case of desktop personalisation.

All of the Effects were assessed, across both contexts of personalisation. The category Feeling of Ownership was omitted from the analyses because of the problematic status of this category as both a Disposition and as an Effect. This issue is taken up in greater detail in the next chapter where a more complex analysis of the questionnaire takes place. The reader is advised to refer to section 9.2 for further details on the method.

8.3 Results

Section 8.3.1 describes the questionnaire items that were used to assess the Effects whereas 8.3.2 is concerned with illustrating the results of the two factor analyses.

8.3.1 Descriptives of the Effects of personalisation

Table 8.1 lists the means and standard deviations for the questions that assessed the Effects of the TPA, across the two areas of the questionnaire, home page and desktop personalisation. The number of responses in the home page part was 82. A total of 97 responses were entered into the analysis of the desktop part. Column 1 in Table 8.1 indicates the Effect each of the questions assessed. The second column is used to separate the two areas of the questionnaire and column three presents the question that was used to assess the Effect, for the two areas, respectively. Finally, column four lists the means and standard deviations for the items. A 5-point Likert scale, ranging from 1 (totally agree) to 5 (totally disagree) was used implying that a low score on a particular question is associated with a high degree of that specific Effect.

The questions were not presented to the respondents in the order they appear in the table, hence the lack of order in the numbering of the questions. Note also that although the questions assessing the two personalisation contexts appear together in the table, these contexts were separated from each other in the actual questionnaire.

Effect from TPA	Context	Question (Strongly agree 1 2 3 4 5 Strongly disagree)	Mean (SD)
Ease of Use	Home page (n=82)	17. The site is easy to use	1.67 (.77)
	Desktop (n=97)	17. The desktop of the computer is easy to use	1.77 (.86)
Improved Aesthetics	Home page (n=82)	15. The site is aesthetically pleasing	2.59 (1.12)
	Desktop (n=97)	15. The desktop of the computer I use is aesthetically pleasing	2.50 (1.19)
Recognition of System	Home page (n=82)	16. The site is easy to recognise	2.07 (.94)
	Desktop (n=97)	16. The desktop of the computer I use is easy to recognise	2.10 (1.18)
Reflection of Personal Identity	Home page (n=82)	18. The site reflects my personal identity	2.33 (1.21)
	Desktop (n=97)	18. The desktop of the computer I use reflects my personal identity	3.15 (1.24)
Reflection of Group Identity	Home page (n=82)	11. The site reflects the kind of people I associate with	3.06 (1.20)
	Desktop (n=97)	11. The desktop of the computer I use is reflects the kind of people I associate with	3.82 (1.12)
Familiarity with System	Home page (n=82)	9. The site feels familiar	2.07 (1.03)
	Desktop (n=97)	9.The desktop of the computer I use feels familiar	1.74 (.96)
System Feels Personal	Home page (n=82)	13. The site feels personal	2.33 (1.21)
	Desktop (n=97)	13. The desktop of the computer I use feels personal	2.41 (1.23)
Feeling in Control	Home page (n=82)	12. I am in control of the site	1.35 (.74)
	Desktop (n=97)	12. I am in control of the desktop of the computer I use	1.73 (.93)
Feeling of Ownership	Home page (n=82)	14. I feel ownership over the site	1.66 (.97)
	Desktop (n=97)	14. I feel ownership over the computer.	2.40 (1.46)
Release from Boredom	Home page (n=82)	19. Personalising the appearance of the site is something to do when you are bored	2.98 (1.34)
	Desktop (n=97)	19. Personalising the appearance of the desktop is something to do when you are bored	2.79 (1.31)
Fun	Home page (n=82)	20. Personalising the appearance of the site is fun.	2.51 (1.18)
	Desktop (n=97)	20. Personalising the appearance of the desktop is fun.	3.04 (1.12)
Positive Associations	Home page (n=82)	21. Personalising the appearance of the site brings about positive feelings	2.59 (1.11)
	Desktop (n=97)	21. Personalising the appearance of the desktop brings about positive feelings	2.99 (1.24)
Attachment to System	Home page (n=82)	10. I feel attachment toward the site	2.66 (1.24)
	Desktop (n=97)	10. I feel attachment toward the computer	3.04 (1.04)
Accomm'ing Current Em. State	Home page (n=82)	22. Personalising the appearance of the site enables me to reflect my mood.	3.52 (1.17)
	Desktop (n=97)	22. Personalising the appearance of the desktop enables me to reflect my mood.	3.59 (1.16)

Table 8.1. Means and standard deviations for the questionnaire items that assessed the Effects of personalisation, across home pages and desktops.

The items were examined for floor and ceiling effects that might lead to reduced variance and hence an inability to correlate with other variables The mean of the question assessing Feeling of Control, 1.35, in the context of home page personalisation is closest to a floor effect. However, the standard deviation of .74 indicates that opinions varied with regard to this construct, making the use of this item acceptable.

When making comparisons between the scores on the items between the two contexts, the largest differences appear in the degree to which the respondents perceived the two contexts to allow the reflection of personal and group level identities. Home page personalisation is associated with the scores of 2.33 and 3.06 for these two Effects, respectively, as compared to 3.15 and 3.82, respectively, for the personalisation of desktop. This is indicative of the home page being perceived to allow a higher degree of identity expression than the desktop of the computer. Systematic analyses of the differences in the scores between home page and desktop personalisation will not be performed here. Differences are likely to reflect the fact that each personalisation context is associated with its specific characteristics, an issue that has been discussed previously.

8.3.2 Factor analysis on the Effects

In order to test whether the Cognitive, Social and Emotional Effects receive support when factor analysing the scores on the Effects, principal components analysis (PCA) with varimax rotation was run on these variables, in both home page and desktop personalisation. Item 14 (Feeling of Ownership) was not entered to the analysis due to its problematic status. 8.3.2.1 presents the results of the PCA on home page personalisation Effects and 8.3.2.2 presents the corresponding results on desktop personalisation.

8.3.2.1 PCA on Effects of home page personalisation

PCA revealed three components with eigenvalues greater than 1.0, which accounted for 59.3% of the variance. The table below illustrates the extraction sums of squared loadings (SSL) and rotation SSL for the three-component solution.

Com-ponent	Extraction SSLs			Rotation SSLs		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	4.511	34.698	34.698	2.665	20.504	20.504
2	1.986	15.273	49.972	2.645	20.342	40.846
3	1.213	9.335	59.306	2.400	18.460	59.306

Table 8.2. Extraction SSLs and rotation SSLs for the three-component solution in the Effects of personalisation of home pages.

As indicated by Table 8.2, Components 1 and 2 each explained approximately 20% of the variance, whereas Component 3 had a smaller explanatory power, 18.5%. Table 8.3 illustrates the output matrix from the PCA. Absolute values below .40 were suppressed.

	Component		
	1	2	3
Ease of Use			.587
Improved Aesthetics			.780
Recognition of System			.690
Reflection of Group Identity		.762	
Reflection of Personal Identity		.708	
Familiarity with System		.450	.679
System Feels Personal		.774	
Feeling in Control		.467	
Release from Boredom	.746		
Fun	.797		
Positive Associations	.715		
Attachment to System		.646	.407
Accommodating Current Emotional State	.764		

Table 8.3. Rotated component matrix for the Effects of personalisation in home page personalisation. Three components were extracted.

The factors present in Factor 1 included Release from Boredom, Fun, Positive Associations, and Accommodating Current Emotional State. All of these were categorised as Emotional Effects in the TPA. Another commonality between these items was that they were associated with short duration, being particularly relevant during the personalisation process. To emphasise the momentary nature of the attributes in this category, Factor 1 was referred to as 'Transient Emotional Effects'.

The rest of the categories classified as Social and Emotional Effects in the TPA constituted Factor 2. These included Reflection of Personal and Group Identity,

Familiarity with System, System Feels Personal, Feeling in Control and Attachment to System. In contrast to the Transient Emotional Effects, these were implications likely to be relevant over a wider time scale. This group of Effects was referred to as 'Enduring Emotional Effects'.

The items present in Factor 3 corresponded, to a great extent, to the super-category Cognitive Effects. The factors in Component 3 included Ease of Use, Improved Aesthetics, Recognition of System, Familiarity with System, and Attachment to System. The three first were classified as Cognitive Effects in the TPA.

The fact that Familiarity with System was present in Component 3 was not surprising, as familiarity is semantically close to the notion of recognition. That is, it was conceivable for Familiarity to be regarded as a Cognitive Effect rather than as an Emotional Effect. The corresponding results of the factor analysis on desktop personalisation were thought to provide an indication of whether Familiarity should be shifted to the super-category Cognitive Effects.

It was difficult to explain why Attachment to System was clustered in Factor 3. The fact that it correlated more with Component 2 disposed of this problem, however, as it suggested that it should be regarded as an Enduring Emotional Effect rather than as a Cognitive one.

In summary, the components extracted were consistent with the TPA nevertheless requiring minor adaptations to be made to the super-categories categorising the Effects. The existence of the super-category Cognitive Effects received support. Whether or not to shift Familiarity with System to this category remained to be seen. The results suggested that the super-categories Social and Emotional Effects needed revision. Transient and Enduring Emotional Effects provided a more appropriate categorisation of the socio-emotional Effects. The results of the factor analysis on desktop personalisation were suggested to provide indication of whether the changes suggested here should be incorporated to the TPA. Consistency in the results across the two domains was thought to make changes justified.

8.3.2.2 PCA on Effects of desktop personalisation

A PCA with varimax rotation was run on the Effects of desktop personalisation, in both home page and desktop personalisation. This factor analysis also revealed three

components with eigenvalues greater than 1. These factors explained 60.6% of the variance. Table 8.4 presents the extraction and rotation SSLs for the three-component solution.

Com-ponent	Extraction SSLs			Rotation SSLs		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	4.756	36.584	36.584	2.816	21.662	21.662
2	1.816	13.967	50.551	2.786	21.433	43.095
3	1.308	10.062	60.614	2.277	17.519	60.614

Table 8.4. Extraction and rotation SSLs for the three-component solution in the Effects of personalisation in desktop personalisation.

Factors 1 and 2 each contributed for above 20% of the total variance, 21.7% and 21.4%, respectively. Component 3 had a smaller explanatory value, 17.5%. The next table shows the extracted components.

	Component		
	1	2	3
Ease of Use			.813
Improved Aesthetics		.569	
Recognition of System		.687	
Reflection of Group Identity		.686	
Reflection of Personal Identity		.646	
Familiarity with System			.672
System Feels Personal		.701	
Feeling in Control		.518	.540
Release from Boredom	.659		
Fun	.765		
Positive Associations	.746		
Attachment to System			.608
Accommodating Current Emotional State	.823		

Table 8.5. Rotated component matrix for the Effects of personalisation in desktop personalisation. Three factors were extracted.

As indicated by Table 8.5, the items present in Component 1, i.e., Release from Boredom, Fun, Positive Associations, and Accommodating Current Emotional State, were the same as the ones present in Component 1 in the context of web site personalisation, adding weight to the reliability of the super-category Transient Emotional Effects.

Component 2 was associated with the categories Improved Aesthetics, Recognition of System, Reflection of Group Identity, Reflection of Personal Identity, System Feels Personal, and Feeling in Control. With the exception of the first two categories, Improved Aesthetics and Recognition of System, Component 2 was consistent with the super-category Enduring Emotional Effects. The fact that Improved Aesthetics and Recognition of System appeared in this component was problematic, as these were categorised as Cognitive Effects, both in the TPA and in the results of the factor analysis on home page personalisation. As discussed in Section 7.4.2, aesthetics could be considered as an emotional implication. Why Recognition of System appeared in Component 2 was more difficult to explain, as this quality would be more readily associated with a task-based motivation.

Component 3 consisted of Ease of Use, Familiarity with System, Feeling in Control and Attachment to System. The first two could be conceived of as Cognitive Effects making this category consistent with the one that emerged in the context of home page personalisation. Moreover, shifting Familiarity with System to this super-category, as suggested in the previous section, received support. Feeling in Control has been regarded as an Emotional Effect. The fact that it appeared in Component 3, i.e., as a Cognitive Effect, raised problems. The inconsistency was alleviated because Feeling in Control was also present in Component 2. An inconsistent result that could not be disposed of, however, was that Attachment to System appeared in the Cognitive Effect group.

One the whole, the results of the factor analysis in the desktop context were more problematic than in home page personalisation, as three factors appeared in components one would not have associated them with. Improved Aesthetics and Recognition of System could be conceived of as Cognitive rather than Enduring Emotional Effects and Attachment to System as an Enduring Emotional Effect rather than as a Cognitive one. Despite these problems, there was still evidence of the existence of the same three super-categories as in the area of home pages, i.e., Transient Emotional Effects, Enduring Emotional Effects, and Cognitive Effects. The next section discusses whether the results were consistent enough to enable changes to be made to the structure of the TPA.

8.4 Discussion

The factor analyses that were performed on home page and desktop personalisation suggest that it would be more appropriate to classify the socio-emotional Effects of personalisation in terms of Transient Emotional Effects and Enduring Emotional Effects than with the help of the super-categories Social and Emotional. The super-category Cognitive Effects, on the other hand, should be modified by shifting Familiarity with System to this group. This is conceivable as familiarity and recognition are semantically close to each other.

One could argue that making these changes to the TPA is not entirely justified. Although the results of the PCA in regard to home pages were unproblematic, the context of desktop personalisation confuses the interpretation in that three Effects, Improved Aesthetics, Recognition of System, and Attachment to System, appeared in 'inappropriate' categories casting doubt to the existence of the super-categories Cognitive and Enduring Emotional Effects.

To deal with this inconsistency between the results of the two factor analyses one could avoid altogether classifying the Effects to super-categories. The modifications described in the opening paragraph of this section are made to the TPA, however, because of the perfect overlap of categories present in Transient Emotional Effects and because this new factor structure is logical. It is natural for the emotional implications of any given behaviour to be divided to short-term and long-term ones. Because this new factor structure received only partial support in the context of desktop personalisation, the Effects are considered both individually and in terms of composite super-category scores when performing the correlational analysis in the next chapter.

Table 8.6 presents the revised super-categories of Effects. Note that Feeling of Ownership is included in the super-category Enduring Emotional Effects although it was not included in the factor analytic refinement.

Effects of personalisation on user

Cognitive
Ease of Use
Improved Aesthetics
Recognition of System
Familiarity with System

Transient Emotional
Release from Boredom
Fun
Positive Associations
Accommodating Current Emotional State

Enduring Emotional
Reflection of Personal Identity
Reflection of Group Identity
System feels Personal
Feeling in Control
Feeling of Ownership
Attachment to System

Table 8.6. Revised Effects in the TPA. The Social and Emotional Effects were changed to reflect the results of the factor analysis. The new factors are Transient and Enduring Emotional Effects. Note also that the category Familiarity with System is now a Cognitive Effect.

The present analysis raised future research implications because of the somewhat ambiguous results in desktop personalisation in regard to the super-categories Cognitive Effects and Enduring Emotional Effects. Replication of the questionnaire on a novel area of personalisation would present a possible way of addressing the reliability of the new factor structure.

Chapter 9. Correlational analysis of personalisation of appearance of home pages and desktops

9.1 Introduction

The previous chapter described a factor analytic exercise that was conducted on the Effects of personalisation across the two areas of the questionnaire. The theory was refined in the light of the findings such that the socio-emotional Effects were divided between Transient and Enduring Emotional Effects. Also, the Category Familiarity with System was shifted to the super-category Cognitive Effects. This chapter describes the correlational analysis, which explored the associations between the Dispositions and Personalisation Behaviour and then between Personalisation Behaviour and Effects.

The correlations between the elements in the theory were performed on two different levels. The higher level was concerned with the correlations between the composite scores for the top-level constructs Dispositions and Behaviour and composite scores for the super-categories Cognitive, Transient Emotional and Enduring Emotional Effects. On a lower level, individual category-to-category correlations were computed. To be able to assess the top-level construct Personalisation Behaviour, it was decomposed to two components, Extent and Frequency of Personalisation.

The Dispositions were predicted to correlate with Behaviour. That is, the greater the extent to which the Dispositions are fulfilled, the greater the magnitude of Personalisation Behaviour. The behavioural factors were expected to correlate with the extent to which this process evokes Effects in the user.

Access to individuals possessing a personal web user area at the university influenced the selection of home pages for the interest of the questionnaire. The ability to use the contact details of hundreds of individuals personalising a given system was an opportunity worth exploiting. Further analysis on the nature of home pages showed that this was a promising research area also for other reasons.

Personal home pages have been found to be associated with certain user-preferred, stable elements, i.e., items that are commonly used by the owners of these sites to personalise these (Dillon & Gushrowski, 2000). Dillon and Grushrowski (2000) objectively determined the relative frequencies of elements that are used to personalise

home pages and found that the greater the extent to which the home page contained these common elements, the more readily it was recognised by the user to represent a stereotypical home page. There was also a high correlation between the relative frequency of the personalisation item and the degree to which these participants thought it should be included in any "good personal home page". These two positive correlations led Dillon & Gushrowski to conclude that home pages have evolved into a truly digital genre. The findings have two implications on this study. First, they suggest that the personalisation of a home page is a valid context of personalisation of appearance and hence worth investigating. Second, the personalisation items proposed by Dillon & Gushrowski (2000) to be relevant in home page personalisation may be used to derive an objective measure for Extent of Personalisation for any given home page.

To generate the measure for Extent of Personalisation for the respondents, each page of the web sites of the respondents was analysed by the investigator. The following factors were taken into account when determining the measure:

- Non-default background colour (other than white)
- Non-default font colour (other than black)
- Non-default font (other than Times New Roman)
- Wallpaper
- Photo of the owner of the home page
- Other personal photo (taken by the owner or an acquaintance of the owner, i.e., a non-copyrighted photo)
- Copy-righted, official photo
- Graphics (other than photo)
- Title graphics (looks like text on the site but appears in the code as an image)
- Animation, sound, or other special effects affecting the appearance of the site

A dichotomous scale was used to assess these ten factors, i.e., each item would either be present or absent from the site. A minimum score for the extent of personalisation would thus be 0 and maximum 10.

The items were generated with the help of the above-discussed Dillon and Gushrowski (2000) study, in which common elements of home pages were listed. Some of the items Dillon and Gushrowski propose as being relevant to home pages, such as a title, e-mail

address, external links, guestbook, and creation date, do not affect the appearance of a web site but are more concerned with the functionality of information content. The graphics, photographs, animation, and sound were thus adopted from the Dillon and Gushrowski (2000) study. Visiting ca. 150 York University personal web user area home pages prior to running the questionnaire and recording everything that was used to decorate these pages with produced the rest of the elements on the list.

To ensure a personal nature of the web site, the participants were asked whether they regarded the site located in their personal user area as their personal home page or whether they had another site that they regarded as more personal. 25 individuals selected the latter alternative. In this case, the individuals were also asked to write down the URL for the site they regarded as their real home page. Thus for the 25 individuals that had selected the external site as the personal one, the Extent of Personalisation was determined on the basis of these external home pages. These individuals were prompted to answer the questions covering home page personalisation with respect to the external site.

To increase the reliability of the analysis, an additional area of personalisation was included in the questionnaire. Personalisation of appearance of the desktop of the computer the respondent uses at the university was selected because the work-based computer was a previously unexplored area of personalisation.

To acquire an indication of whether conducting a personalisation questionnaire on home pages and desktops of university computers would be feasible in the first place, an email containing a few questions on both areas of personalisation was sent to 728 individuals that were listed as owners of personal user web areas with the University of York server. Of the 168 individuals who responded to this email, ca. 90% had personalised the appearance of their web site more than once. The respective figure for desktop personalisation was 50%. The high rate of personalisation suggested that people personalised in these two contexts and that consequently assessing the user perceptions toward these processes was feasible. This survey will not be described in further detail because the actual questionnaire assessed the same issues but in a more detailed fashion. The next section describes the questionnaire that was used.

9.1.1 Personalisation questionnaire

The scores on all of the variables in regard to Dispositions and Effects were based on self-reported, subjective estimates. Also the behavioural variables were assessed using the questionnaire, with the exception that Extent of Personalisation of home pages, discussed in the section above, was an objective measure. The questionnaire items could be classified to those measuring Dispositions, Behaviour, and Effects. Also other questions were asked. Sections 9.1.1.1 – 9.1.1.4 describe each of these. The questions are presented in the Method section, in Tables 9.1 and 9.2 for home pages and desktops, respectively.

9.1.1.1 Assessment of Dispositions

User perceptions in regard to three of the Dispositions, Frequency of Use of System, Knowledge of Personalisation, and SEC, were assessed in both areas of the questionnaire, using individual scales. Additionally, a measure on Ownership of System was acquired in regard to personalisation of the desktop. The category Ownership of System is a more objective representation of the concept of ownership than the Effect Feeling of Ownership. Ownership of System was not assessed in home page personalisation because it was thought that it would be difficult to assess ownership of software from an objective perspective. Ownership of desktop was a more feasible concept because this was thought to be affected by whether the individual used a shared or a private computer.

Dispositions Absence of Technical Constraints and Effectiveness of Personalisation Items were assessed with regard to desktop personalisation (questions 2, 7, and 8 in Table 9.2) but these were not entered to the correlational analysis because the validity of these questions was thought to be low when further analysing the questionnaire items.

9.1.1.2 Assessment of Behaviour

The behavioural variable Extent of Personalisation of desktop was a composite score based on the extent to which the respondent had changed the following desktop personalisation items at least once: background colour, background image, screensaver, sounds, icons, desktop animation, and desktop theme. These features were selected on the

basis of an analysis of items that can be used to personalise the appearance of a desktop. A composite measure for Frequency of Personalisation for each subject was acquired by averaging across the frequency at which the respondent personalised each of the items listed above.

How the measure for Extent of Personalisation was derived for home page personalisation is described in Section 9.1. Also this variable was represented with a composite score. In contrast, Frequency of Personalisation of home pages was not a composite. A single question with six options ranging from 'never' to 'more than once a day' was used to assess this variable.

9.1.1.3 Assessment of Effects

All of the Effects were assessed using individual scales. The concept of ownership is present in the theory as both a Disposition and as an Effect. A conservative approach was taken and the category Feeling of Ownership, i.e., ownership as an Effect, was not entered to the correlational analysis. Thus the only context where the issue of ownership played a role in the correlational analysis was as a Disposition in the part of the questionnaire assessing desktop personalisation. Omitting Feeling of Ownership from the correlational analysis took place to avoid circularity. The problematic status of ownership in TPA is taken up in the Discussion.

9.1.1.4 Other items

Questions additional to TPA were asked in the home page part of the questionnaire. Item 1 (see Table 9.1) was concerned with the age of the site. This question was asked because it was thought that it could be used to filter out the respondents having been in possession of the site for a short time. The scores on this filtering question were ignored, however, because it was assumed that variation with respect to this attribute would be useful.

Item 3 assessed the frequency at which the respondents updated their sites. This was used as a preparatory question for item 4, which assessed Frequency of Personalisation, an attribute of Personalisation Behaviour.

Items 5 and 8 were concerned with whether the home page was visited frequently by others and whether it was directed at the respondent or at others. These questions addressed the hypothesised issue of home pages being associated with two distinct usage functions. Some individuals are likely to use a home page for self-presentational purposes. One would expect sites of this kind to be visited mainly by others. Other home page owners, on the other hand, may have designed their sites to be used mainly by themselves and for task-based reasons, such as access to information. Here the web site could act as a portal, for instance, which would enable fast access to web sites and files that are used frequently by the owner. Although items 5 and 8 were concerned with this issue, a distinction was not made between these usage functions when analysing the data.

9.2 Method

The method section describes the participants and the questionnaire items.

9.2.1 Participants

An invitation to participate in the study was sent to the 168 individuals that had responded to the initial survey described in Section 9.1. The population consisted of students and members of staff at the University of York. A total of 97 individuals completed the questionnaire. All of the 97 responses were included in the analysis with regard to the part of the questionnaire assessing desktop personalisation. The data of 15 respondents were excluded from the home page personalisation part, as the web sites of these individuals were not regarded as personal home pages. In line with Dillon & Gushrowski (2000), home pages were defined as belonging to a named individual who was not advertising or selling a business or service and whose information content primarily related to herself.

The occupation, gender and age of the respondents were not recorded. This was to anonymise the questionnaire, an aspect that was thought to encourage people to take part in the study.

9.2.2 Questionnaire items

The questionnaire was web-based, and it consisted of two parts. The first assessed personalisation of appearance of home pages, the second personalisation of desktop of the computer that was used by the respondent at the university. This was likely to refer to a personal workstation in case of staff members or to a shared computer in the computer room in case of students.

Table 9.1 illustrates the questions that were directed at home page personalisation. The first column includes the question, second responses allowed, and the final column the aspect of the TPA the question assessed. The word 'other' is used in case the question did not assess TPA. Questions entered to the correlational analysis are printed in bold. Table 9.2 shows the questions that were directed at personalisation of the desktop of the university computer. Again, questions entered to the correlational analysis are printed in bold.

Item	Scale	Aspect of TPA
1. How old is the site?	1=3+ years; 2=1-3 years; 3=6-12 months; 4=1-5 months; 5=<once a month	Other
2. How frequently, on average, do you visit your site?	1=never; 2=<once/year; 3=1-6/year; 4=6-11/year; 5=50+/year; 6=at least 1/day	Frequency of Use of System
3. How many of these visits are to update your site?	1=every one; 2=most; 3=half; 4=minority; 5=none	Other
4. How often do you update the appearance rather than the content of the site?	Same as item 2	Frequency of Personalisation
5. How many times, would you guess, has your site been visited by others?	1=0-50; 2=200-300; 3=300-500; 4=500-1000; 5=1000+	Other
6. I am competent at constructing web sites.	Strongly agree 1 2 3 4 5 Srongly disagree	Knowledge of Personalisation
7. I consider the web site	Work-related 1 2 3 4 5 Recreational	SEC
8. The *web* site directed at	Myself 1 2 3 4 5 Others	Other
9. The site feels familiar	Strongly agree 1 2 3 4 5 Srongly disagree	Familiarity with System
10. I feel attachment toward the site	Strongly agree 1 2 3 4 5 Srongly disagree	Attachment to System
11. The site reflects the kind of people I associate with	Strongly agree 1 2 3 4 5 Srongly disagree	Reflection of Group Identity
12. I am in control of the site	Strongly agree 1 2 3 4 5 Srongly disagree	Feeling in Control
13. The site feels personal	Strongly agree 1 2 3 4 5 Srongly disagree	System Feels Personal
14. I feel ownership over the site	Strongly agree 1 2 3 4 5 Srongly disagree	Feeling of Ownership
15. The site is aesthetically pleasing	Strongly agree 1 2 3 4 5 Srongly disagree	Improved Aesthetics
16. The site is easy to recognise	Strongly agree 1 2 3 4 5 Srongly disagree	Recognition of System
17. The site is easy to use	Strongly agree 1 2 3 4 5 Srongly disagree	Ease of Use
18. The site reflects my personal identity	Strongly agree 1 2 3 4 5 Srongly disagree	Reflection of Personal Identity
19. Personalising the appearance of the site is something to do when you are bored	Strongly agree 1 2 3 4 5 Srongly disagree	Release from Boredom
20. Personalising the appearance of the site is fun.	Strongly agree 1 2 3 4 5 Srongly disagree	Fun
21. Personalising the appearance of the site brings about positive feelings	Strongly agree 1 2 3 4 5 Srongly disagree	Positive Associations
22. Personalising the appearance of the site enables me to reflect my mood.	Strongly agree 1 2 3 4 5 Srongly disagree	Accommodating Current Emotional State

Table 9.1. List of questions that were used to assess the personalisation of home pages. Questions entered to the correlational analysis are printed in bold.

Item	Scale	Aspect of TPA
1. The computer I use at the university is used	1=mainly by me; 2=by me and a few others; 3=by me and many others	Ownership of System
2. Operating system of the computer	1=N/A; 2=Windows 2000; 3=Windows 98; 4= Windows 95; 5=Other,what?	Absence of Tech. Constraints
3. I use the computer on average	1=0-4; 2=5-9; 3=10-19; 4=20-39; 5=40+ hours/week	Frequency of Use of System
4. I use the computer for	Work-related 1 2 3 4 5 recreational purposes	SEC
5. For each item, please click on the appropriate button to indicate the frequency at which you personalise that particular aspect of the desktop: Screen resolution, Background colour, Background image, Screensaver, Sounds, Icons, Desktop animations, Desktop theses	1=Never; 2=Once; 3=1/year or less; 2-5/year; 6-12 / year; 13-30/year; 30+/year	Extent and Frequency of Personalisation
6. I am competent at making these changes.	Strongly agree 1 2 3 4 5 Strongly disagree	Knowledge of Personalisation
7. I would personalise the desktop to a greater extent if the computer allowed me	Same as item 6	Absence of Tech. Constraints
8. There should be more options to choose from when personalising the appearance of the desktop	Same as item 6	Effectiveness of Personalisation Items
9.The desktop of the computer I use feels familiar	Same as item 6	Familiarity with System
10. I feel attachment toward the site	Same as item 6	Attachment to System
11. The desktop of the computer I use reflects the kind of people I associate with	Same as item 6	Reflection of Group Identity
12. I am in control of the desktop of the computer I use	Same as item 6	Feeling in Control
13. The desktop of the computer I use feels personal	Same as item 6	System Feels Personal
14. I feel ownership over the computer.	Same as item 6	Feeling of Ownership
15. The desktop of the computer I use is aesthetically pleasing	Same as item 6	Improved Aesthetics
16. The desktop of the computer I use is easy to recognise	Same as item 6	Recognition of System
17. The desktop of the computer is easy to use	Same as item 6	Ease of Use
18. The desktop of the computer I use reflects my personal identity	Same as item 6	Reflection of Personal Identity
19. Personalising the appearance of the desktop is something to do when you are bored	Same as item 6	Release from Boredom
20. Personalising the appearance of the desktop is fun.	Same as item 6	Fun
21. Personalising the appearance of the desktop brings about positive feelings	Same as item 6	Positive Associations

22. Personalising the appearance of the desktop enables me to reflect my mood.	Same as item 6	Accomm'ing Current Em. State

Table 9.2. List of questions that were used to assess personalisation of the university computer's desktop. Questions entered to the correlational analysis are printed in bold.

The data were recorded on a database maintained by the main server of the university. The respondents were not allowed to submit the data of either part of the questionnaire until they had completed it. Table 9.3 summarises the variables that were included in the correlational analysis presented in the Results section.

	Element of TPA assessed		
	Dispositions	Personalisation Behaviour	Effects
Home page	Frequency of Use of System, Knowledge of Personalisation, SEC, and Composite Disposition	Frequency of Pers. (subjective), Extent of Pers. (objective composite), and Composite Behaviour	All 14 TPA Effects, apart from Feeling of Ownership. Composite Cognitive, Transient Emotional, and Enduring Emotional Effects
Desktop	Frequency of Use of System, Ownership of System, Knowledge of Personalisation, SEC, and Composite Disposition	Frequency of Pers. (subjective composite), Extent of Pers. (subjective composite), and Composite Behaviour	All 14 TPA Effects, apart from Feeling of Ownership. Composite Cognitive, Transient Emotional, and Enduring Emotional Effects

Table 9.3. Summary of the aspects of theory that were assessed across the two areas of the questionnaire.

Averaging across the scores on the individual categories derived the composite scores. In addition to the variables above, measures of whether the ten individual personalisation features used to decorate the home pages had been incorporated on the home pages of each respondent were used as independent variables to perform multivariate regression. Section 9.3.4 includes further details on this.

9.3 Results

Section 9.3.1 presents a description of the questionnaire items, for both home page and desktop personalisation. It also lists the within-Disposition, within-Behaviour, and within-

Effects correlations. 9.3.2 is concerned with presenting the Disposition-to-Behaviour correlations across the two contexts and 9.3.3. presents the Behaviour-to-Disposition correlations. Finally, 9.3.4 illustrates the results of a multivariate regression analysis for home page personalisation, using the individual features constituting the composite measure Extent of Personalisation as the independent variables and the three super-categories classifying the Effects as the dependent variables.

The correlational analysis will take place at both individual, category-to-category level and at higher-level correlations, such as composite Behaviour-to-composite Cognitive Effects. The individual category-to-category level of analysis is required because the super-categories that emerged as a result of the factor analyses described in the previous chapter were associated with inconsistencies across the two domains of personalisation. Thus to account for the possibility of the three super-categories Cognitive, Transient Emotional and Enduring Emotional Effects being invalid representations of the Effects they are classifying, also individual category-to-category correlations should be computed.

9.3.1 Descriptive statistics and intra super-category correlations

9.3.1.1 Descriptives

The table below illustrates the means and standard deviations for the questions assessing the Dispositions of personalisation. The two contexts of personalisation were assessed in separate parts, but the means and standard deviations are presented in the same table here.

Disposition	Context	Question	Scale	Mean (S.D.)
Frequency of Use of System	Home page (n=82)	2. How frequently, on average, do you visit your site?	1=never; 2=<once/year; 3=1-6/year; 4=6-11/year; 5=50+/year; 6=at least 1/day	5.15 (1.32)
	Desktop (n=97)	3. I use the computer on average	1=0-4; 2=5-9; 3=10-19; 4=20-39; 5=40+ hours/week	3.69 (1.01)
Ownership of System	Home page (n=82)	Not assessed		
	Desktop (n=97)	1. The computer I use at the university is used	1=mainly by me; 2=by me and a few others; 3=by me and many others	1.54 (.83)
Knowledge of Personalisation	Home page (n=82)	6. I am competent at constructing web sites.	Strongly agree 1 2 3 4 5 Strongly disagree	2.37 (1.19)
	Desktop (n=97)	6. I am competent at making these changes.	Strongly agree 1 2 3 4 5 Strongly disagree	1.69 (1.10)
SEC	Home page (n=82)	7. I consider the web site	Work-related 1 2 3 4 5 Recreational purposes	2.93 (1.46)
	Desktop (n=97)	4. I use the computer for	Work-related 1 2 3 4 5 Recreational purposes	2.27 (.92)

Table 9.4. Descriptives for the Dispositions across home page and desktop personalisation.

When comparing the scores on the variables where similar questions and scales were used, the desktop context was associated with a greater degree of Knowledge of Personalisation whereas home page personalisation was associated with a greater degree of Socio-emotional Context of Use. These differences are not surprising. Personalisation of appearance of a web site is demanding in terms of skills and knowledge required. A personal web site, however, is more likely to be associated with a leisure-based usage context, because a university-based computer is often used for work-related tasks.

It is difficult to use a summary table such as the one above for the assessment of Personalisation Behaviour. Individual descriptions of these variables are needed. When it comes to home pages, the table below presents, for each personalisation item, the percentage of the respondents that had personalised that particular item. The features are arranged in descending order in terms of the frequency of incorporating these. The measures were derived objectively by visiting the home pages of the respondents.

Personalisation item	Percentage of participants incorporating the item on the home page (n=82)
Non-default background colour	51.1
Graphics	41.5
Photo of the owner of the home page	33.0
Non-default font colour	30.9
Non-default font	25.5
Title graphics	24.5
Other personal photo	22.3
Animation, sound, or other special effects	22.3
Copy-righted, official photo	18.1
Wallpaper	13.8

Table 9.5. The percentage to which the respondents used each of the home page personalisation items.

As the table indicates, the most popular items to be personalised were background colour, graphics, photos of self, and non-default font colours. Calculating how many of the items listed in Table 9.5 each respondent had personalised constituted the measure of Extent of Personalisation. On average, the participants incorporated 2.8 of a total of ten these features on their sites, with the standard deviation being 2.6. The low mean score indicates a tendency not to use many of the items that are available. This could either be due to the fact that in general, home pages are simple in aesthetic terms or that the sample contained a large proportion of home page owners that were not competent at constructing web sites.

Question 4 in Table 9.1, "How often do you update the appearance rather than the content of the site?", was used to acquire a measure of Frequency of Personalisation. The scale was as follows: 1=never; 2=<once/year; 3=1-6/year; 4=6-11/year; 5=50+/year; 6=at least 1/day. The mean was 2.29 (SD=.95) indicating that the individuals personalised the appearance of their sites on average once a year.

The table below presents the extent to which the desktop items were being personalised among the respondents. The figure printed in bold on each row represents the category in which the mean frequency was located for that particular item. For instance when it comes to changing the screen resolution, the mean frequency of accomplishing this change was in the category 'once a year or less'.

Personalisation item	Never (%)	Once (%)	1/year or less (%)	2 - 5 / year (%)	6 - 12 / year (%)	13 - 30 / year (%)	30 + / year (%)
Screen resolution	30.9	35.1	**12.4**	9.3	3.1	2.1	7.2
Background colour	27.8	19.6	**15.5**	22.7	7.2	6.2	1.0
Background image	25.8	13.4	**14.4**	20.6	14.4	8.2	3.1
Screensaver	40.2	17.5	**5.2**	19.6	10.6	5.2	2.1
Sounds	57.7	**12.4**	12.4	11.3	2.1	4.1	0.0
Icons	40.2	14.4	**13.4**	20.6	6.2	5.2	0.0
Desktop animation	**79.4**	4.1	7.2	6.2	3.1	0.0	0.0
Desktop themes	66.0	**9.3**	8.2	10.3	4.1	1.0	1.0

Table 9.6. Frequency of personalisation of the desktop items that were assessed.

The table indicates that the most common items that were personalised were screen resolution, background image, and background colour. Desktop animation was the least popular item. Counting how many of the features listed in Table 9.6 each respondent had personalised at least once derived a composite measure for the Extent of Personalisation. This figure varied between 0 and 8. The average Extent of Personalisation was 4.3 items of a total of eight.

An index for the Frequency of Personalisation was computed for each participant by averaging across the scores on each of the eight items. A low score implied low frequency of personalisation. The mean Frequency of Personalisation was 2.39. Thus, on average, the respondents had personalised each of the desktop items once.

Table 8.1 includes the means and standard deviations for the Effects across the two areas of personalisation. The scores on the items that were omitted from the correlational analysis are included in Appendix 13.

9.3.1.2 Intra super-category correlations

The main interest of the correlational analysis was to acquire an indication of whether the Dispositions correlated with Behaviour, and whether Behaviour correlated with Effects. Whether the items *within* these top-level constructs correlated was of supplementary interest. The within super-category correlations were not used to validate the theory. Rather, it was expected to provide further insight of the dynamics of the process of personalisation of appearance. A detailed within top-level construct analysis

was conducted in the previous chapter on the Effects of personalisation. This section presents the correlations for the dispositional and behavioural super-categories. Note that when computing the correlations, throughout the results section, the directions on the scores of the items were made constant such that a high score on any item implies high magnitude of that particular category. For instance, a high score on the item Familiarity with System would imply that the individual feels a high degree of familiarity over the system. Thus positive correlations are always consistent with the TPA. The correlations computed here are Pearson correlations.

Table 9.7 illustrates the correlations between the three Dispositions Frequency of Use of System, Knowledge of Personalisation and SEC, in home page personalisation.

	Knowledge of Personalisation	SEC
Frequency of Use of System	.357*	.134
Knowledge of Personalisation		.338*

* Correlation is significant at the 0.05 level (2-tailed).

Table 9.7. Intra-dispositional correlations in home page personalisation items.

Two of three correlations were significant at .05 level. Knowledge of Personalisation correlated with Socio-emotional context of use and Frequency of Use of System. For whatever reason SEC and Frequency of Use of System did not correlate with each other.

Table 9.8 presents the intra-dispositional correlations for desktop personalisation items.

	Ownership of System	Knowledge of Personalisation	SEC
Frequency of Use of System	.407**	.012	-.315*
Ownership of System		.001	-.275*
Knowledge of Personalisation			.199

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 9.8. Intra-dispositional correlations in desktop personalisation items.

As the table indicates, there was a strong positive correlation [$r=.407$, $p<.001$] between Frequency of Use of System and Ownership of System indicating that the higher the usage frequency of the computer, the more likely the individual was to be the only user of the computer. This is not a surprising finding as the staff members were likely to be frequent

users of private computers. The students, on the other hand, would be likely to be using a shared computer less frequently as compared to staff members. The negative correlations between Frequency of Use of System and SEC and between Ownership of System and SEC may be reflective of these user groups. The ones using a university computer frequently and not sharing it, i.e., the staff members, would be the ones more likely to be using the computer for work-based purposes.

When it comes to within behavioural correlations, Extent and Frequency of Personalisation correlated with each other significantly in both areas of personalisation. For home page personalisation, the correlation was .285, $p<.05$. The respective personalisation in desktop personalisation was .841, $p<.001$. One can observe a discrepancy here between the subjective-to-objective and the subjective-to-subjective intra-behavioural correlations in home pages and desktops, respectively. The former correlation is lower than the latter. The fact the subjective-to-objective correlation was statistically significant in the first place is a positive sign, however, because it supports the notion that the two ways of measuring Personalisation Behaviour reflect the same top-level construct.

9.3.2 Disposition to Behaviour correlations

Table 9.9 presents the correlations between the three Dispositions and the two behavioural measures in home page personalisation.

	Extent of Personalisation	Frequency of Personalisation
Frequency of Use of System	.296*	.351*
Knowledge of Personalisation	.307*	.281*
SEC	.092	.096

* Correlation is significant at the 0.05 level (2-tailed).

Table 9.9. Disposition to Behaviour correlations in home page personalisation.

In line with the TPA, Frequency of Use of System and Knowledge of Personalisation were positively correlated with both Extent and Frequency of Personalisation. SEC failed to predict either of the behavioural measures.

In the context of desktop personalisation, an additional dispositional variable was Ownership of System, which was determined by whether the respondent was using a private or a shared computer. Table 9.10 illustrates the extent to which the four Dispositions correlate with behavioural measures Extent and Frequency of Personalisation.

	Extent of Personalisation	Frequency of Personalisation
Frequency of Use	.156	.094
Ownership of System	.271*	.178
Knowledge of Personalisation	.325*	.322*
SEC	.001	.118

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.001 level (2-tailed).

Table 9.10. Dispositional to behavioural correlations in desktop personalisation.

There were fewer significant correlations in this area; only three of a total of eight correlations were significant. More specifically, Ownership of System correlated with Extent of Personalisation and Knowledge of Personalisation correlated with both of the behavioural measures.

SEC failed to correlate with the behavioural measures also in desktop personalisation. The failure of SEC to correlate with Extent and Frequency of Personalisation across both areas of the questionnaire will be discussed in Section 9.4.

The final aspect here was whether the top-level constructs, i.e., composite dispositional and composite behavioural scores, correlated with each other. Table 9.11 presents these correlations, with respect to both home page and desktop personalisation. In this, as well as the next section, the composite scores were derived by averaging across all of the variables belonging to the particular top-level construct (or super-category in case of Effects).

	Composite Disposition to Composite Behaviour Correlation
Home page	.374*
Desktop	.396**

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.001 level (2-tailed).

Table 9.11. Composite Disposition to Composite Behaviour correlations in home page and desktop personalisation.

The composite Dispositions correlated with the composite Behaviour across both areas, supporting TPA. The relationship was particularly strong in desktop personalisation [r=.396, p<.001].

9.3.3 Behaviour to Effect correlations

Table 9.12 lists the Behaviour-to-Effect correlations for home page personalisation.

	Extent of Personalisation	Frequency of Personalisation
Ease of Use	.100	-.049
Improved Aesthetics	.296*	.302*
Recognition of System	.278*	.177
Reflection of Personal Identity	.245*	.271*
Reflection of Group Identity	.263*	.168
Familiarity with System	.259*	.140
System Feels Personal	.274*	.322*
Feeling in Control	.192*	.254*
Release from Boredom	.005	.237*
Fun	.240*	.279*
Positive Associations	.179	.129
Attachment to System	.320*	.271*
Accommodating Current Emotional State	.113	.229*

* Correlation is significant at the 0.05 level (2-tailed).

Table 9.12. Behaviour to Effects correlations in the home page personalisation items.

The only Effects of a total of thirteen that did not correlate with either of the behavioural measures were Ease of Use and Positive Associations. Thus in personalisation of appearance of home pages, the greater the Extent and Frequency of personalisation, the stronger the Effects of this process. The next table presents the corresponding correlations for desktop personalisation.

	Extent of Personalisation	Frequency of Personalisation
Ease of Use	.107	.073
Improved Aesthetics	.429**	.352**
Recognition	.382**	.330*
Reflection of Personal Identity	.532**	.514**
Reflection of Group Identity	.186	.193
Familiarity with System	.267*	.246*
System Feels Personal	.391**	.426**
Feeling in Control	.351**	.273*
Release from Boredom	.130	.148
Fun	.407**	.450**
Positive Associations	.396**	.384**
Attachment to System	.390**	.396**
Accommodating Current Emotional State	.362**	.388**

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 9.13. Behaviour to Effects correlations in desktop personalisation.

The Behaviour-to-Effect correlations were as strong as in the context of home page personalisation. Both Extent and Frequency of Personalisation correlated with the Effects to a high degree. In both cases ten of a total of thirteen correlations were statistically significant.

The behavioural measures failed to correlate with Ease of Use, Reflection of Group Identity and Release from Boredom. It would be interesting to determine whether these Effects become more relevant in other contexts, such as mobile phones or web portals.

Rather than regarding the Effects as one top-level construct it was more useful to consider the composites of the three super-categories of Effects when looking at composite Behaviour-to-Effect correlation. Table 9.14 describes the correlations between the composite Behaviour and the composite scores on the three super-categories of Effects.

		Composite Cognitive	Composite Transient Emotional	Composite Enduring Emotional
Composite Behaviour	Home page	.352*	.235*	.419**
	Desktop	.430**	.432**	.558**

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.001 level (2-tailed).

Table 9.14. Composite Disposition to Composite Cognitive, Transient Emotional and Enduring Emotional Correlations in home page and desktop personalisation.

The composite measure correlations provide strong support for the theory in that all of them are significant, in the hypothesised direction.

9.3.4 Multivariate regression

As the category Effectiveness of Personalisation Items suggests, items that are used to personalise the appearance of products may vary in terms of their effectiveness in eliciting responses in the user. The objective data on the home page personalisation items, used when constructing the variable Extent of Personalisation, enabled the investigation of the relative impact of the personalisation features on predicting Effects. A multivariate regression was performed, using the ten personalisation features as the independent variables and the composite scores on the three super-categories as the dependent variables. Table 9.15 presents the results of this regression analysis. It lists the beta score and the t-value and its respective significance level for each regression term.

Dependent Variable	Independent Variable	Beta Score	t	p
Composite Cognitive Effect (R Squared =.234)	Non-default background colour	.219	1.279	.205
	Non-default font colour	.046	-.242	.809
	Non-default font	.384	2.006	.049*
	Wallpaper	.173	.740	.462
	Photo of the owner of the home page	-.310	-1.730	.088
	Other personal photo	.420	2.072	.042*
	Copy-righted, official photo	.176	.948	.399
	Graphics (other than photo)	-.113	-.672	.504
	Title graphics	.230	1.264	.210
	Animation, sound, or other special effects	-.028	-.135	.893
Composite Transient Emotional Effect (R Squared = -.040)	Non-default background colour	-.075	-.302	.763
	Non-default font colour	-.045	-.165	.870
	Non-default font	.104	.374	.709
	Wallpaper	-.134	-.397	.693
	Photo of the owner of the home page	.228	.979	.382
	Other personal photo	.051	.173	.863
	Copy-righted, official photo	-.063	-.021	.983
	Graphics (other than photo)	.054	.222	.825
	Title graphics	.499	1.896	.062
	Animation, sound, or other special effects	-.053	-.177	.860
Composite Enduring Emotional Effect (R Squared = .066)	Non-default background colour	-.035	-.166	.869
	Non-default font colour	.030	.129	.898
	Non-default font	.220	.940	.350
	Wallpaper	.001	.004	.997
	Photo of the owner of the home page	-.102	-.469	.641
	Other personal photo	.498	2.015	.048*
	Copy-righted, official photo	.302	1.197	.235
	Graphics (other than photo)	.178	.871	.387
	Title graphics	.265	1.194	.236
	Animation, sound, or other special effects	-.079	-.312	.756

* Significant at the 0.05 level.

Table 9.15. Results of multivariate regression, with the ten personalisation features being the independent variables and the composite scores on the three super-categories of Effects as the dependent variables.

The table reveals that only two items predicted the outcome of the three dependent variables at a statistically significant level. First, the use of personal photos that do not portray the owner of the page predicted both the Cognitive Effects and Enduring Emotional Effects [t=2.072, p<.05; t=2.015, p<.05, respectively]. Second, the use of non-default font on a home page had an impact on the Cognitive Effects [t=2.006, p<.05]. The t-value of a third item, namely title graphics, approached significance in the case of Transient Emotional Effects [t=1.896, p=.062].

It was an unexpected finding that the use of personal photos influenced the Cognitive Effects. The fact that personal photos were a significant predictor of Enduring Emotional Effects was more understandable. One could expect the use of photos of friends and events meaningful to one's life to have an impact on Feeling of Attachment and System Feels Personal. The fact that the non-default font predicted the magnitude of Cognitive Effects was not surprising either. It is logical that the font type influences, say, the aesthetics and recognisability of the site.

Comparing the pattern of results across the three super-categories gave rise to the notion of each of the super-categories being associated with items specific to that class of Effects. Although these differences were not clearly noticeable, different patterns nevertheless arose. The items specific to Cognitive Effects were non-default font and other personal photos. The latter was also relevant in the super-category Enduring Emotional Effects. Title graphics was the item that played a role in influencing the Transient Emotional Effects.

One of the direct implications of these findings was that the use of the three personalisation items that had an effect on the composite scores, or that were close to a significant effect in the case of title graphics, is recommended if one is to experimentally manipulate personalisation in the context of web page construction. An experiment of this kind was indeed carried out; Chapter 10 provides a description of this.

The multivariate analysis described in this section represented an initial attempt to concentrate on the influence of the personalisation items that are used to decorate the system. The general conclusion was that, consistent with the category Effectiveness of Personalisation Items, some items are more effective than others in influencing the way the user perceives the system.

9.4 Discussion

This chapter provided an analysis of the correlation between the elements in the TPA. In general, the Dispositions, Behaviour, and Effects were positively correlated with each other, consequently supporting the structure of the TPA: the stronger the presence of Dispositions, the bigger the magnitude of Extent and Frequency of Personalisation. Moreover the bigger the magnitude of the behavioural aspects, the stronger the Effects. The clearest indicator of the positive correlation was that the composite scores of

Dispositions, Behaviour, and the three groups of Effects, correlated with each other significantly. Most of the individual Behaviour to Effect correlations were also significant, across both contexts, indicating a strong link between Behaviour and Effects.

The weakest correlation was observed between the Dispositions and Behaviour. In the context of home page personalisation, SEC failed to correlate with Behaviour. In the desktop part of the questionnaire SEC and Frequency of Use of System failed to correlate with the behavioural variables.

The lack of correlation between SEC and the behavioural measures does not necessarily imply that this category does not play a role in the TPA. It may be that that the question that assessed SEC was not valid. The word 'recreational use' was used to refer to the socio-emotional use context; it may simply be the case that these two notions, recreational use and socio-emotional context of use, imply different things. A requirement for SEC is that the system use be associated with socio-emotional motivation and socio-emotional functionality, such as email or games. It would thus be more feasible to assess SEC with the help of two questions. One of the questions would tap motivational issues, the other what kind of functionality the system includes. SEC was a prominent theme throughout Part 2. Omitting SEC from TPA on the basis of this study would therefore be unjustified. To conclude, it is likely that SEC correlates with Personalisation Behaviour. The question of how to assess SEC needs further research.

Despite the weaker results between Dispositions and Behaviour as compared to the link between Behaviour and Effects, Dispositions and Behaviour were nevertheless associated with each other. Seven of a total of thirteen pairs correlated positively and especially home page personalisation was an area where a prominent relationship between the dispositional and behavioural factors was observed. One should also note that this questionnaire only assessed four Dispositions. Increasing the range of Dispositions assessed is an issue that remains to be addresses in the future.

The reason for not taking into account the variable Feeling of Ownership when computing the correlations needs to be discussed. The concept of ownership appears in the theory as both a Disposition and an Effect. In the former area ownership is regarded as something more objective. For instance in the present study, this aspect was assessed in the context of desktop personalisation by asking the respondents to indicate whether they were the only users of the computer they were using at the university. With respect to home pages, objective ownership was thought to be more difficult to assess because web

sites are not associated with a particular piece of hardware. That is, objective ownership of software is a questionable concept.

As an Effect, ownership has a more subjective quality; hence it is referred to as *Feeling* of Ownership in the TPA. The notion of ownership thus seems to have two distinct qualities in the theory, an objective and a subjective one. Despite this distinction, however, even objective ownership is associated with subjectivity in the TPA because as a User-dependent Disposition, Ownership of System depends on how the user interprets the objective ownership of the system. Thus on both sides, the crucial process in regard to ownership is the *perception* of ownership. Observing a particular notion in two different stages of a model that is inherently causal is questionable, as it would introduce circularity. This does not imply that the theory does not possess a circular nature. It is conceivable that some aspects in the theory become dispositional factors once they have emerged as Effects of the process of personalisation. For instance in case of ownership, ownership as an Effect may feed forward to the dispositional side of the model increasing an individual's Disposition to personalise again. There are other variables that may share the same dynamics. E.g., Feeling of Control is likely to be linked to Feeling of Ownership implying that also this Effect may lead to further personalisation.

In summary, the two areas of personalisation that were assessed supported the dynamics inherent to the TPA. In both contexts, evidence was found with regard to the Dispositions correlating with Behaviour and with regard to Behaviour correlating with Effects. These associations were apparent at both individual category-to-category levels and at the more general level of composite score correlations.

One should note that validating the theory by assessing personalisation in previously unexplored contexts, home pages and desktops of work-based PCs, was a risky manoeuvre. Particularly the former area could be problematic, in that home pages are sometimes designed solely for self-presentational purposes. The results may not have been consistent with the TPA, which in turn would have resulted in a need to revise the theory. The benefit associated with changing the area of investigation was that in case of consistent results, a stronger claim could be made for the interpretive power of the theory.

The present study provided evidence toward the notion of certain elements in the theory of personalisation correlating with others. This was particularly beneficial for the TPA, because the personalisation contexts represented previously unexplored areas. An aspect that remained to be determined and that was associated with the correlational analysis performed here was whether Dispositions cause Behaviour and whether

Behaviour causes Effects. This was addressed in the final study of the thesis, which involved running an experiment on personalisation of home pages.

Chapter 10. Experiment 3: personalisation of appearance of home pages

10.1 Introduction

The results of the personalisation questionnaire described in the previous chapter supported the basic dynamics inherent to the TPA whereby certain Dispositions correlate with Personalisation Behaviour, which correlates with Cognitive and Emotional Effects. Despite the correlations that emerged between Dispositions, Behaviour, and Effects, direct causal relationships could not be established between these elements, as the study was not longitudinal. The data did not allow us to conclude that Dispositions led to Behaviour, which led to Effects.

This study explored whether evidence could be found for causality using a controlled experiment involving personalisation of appearance of personal home pages. Examining the impact of the Extent of personalisation of home pages on the magnitude of Effects of the process was thought to provide an indication of whether a cause and effect relationship exists between these two aspects of the theory.

In an experiment utilising a between subjects design individuals novice to web site construction took part in one of two web site tuition sessions. The participants were instructed how to construct a home page and the content on these pages between the groups was the same apart from the extent to which the participants decorated their sites. The participants in the personalisation present (PP) group were allowed to personalise the background colour, font type, personal image of self, other personal image, and the appearance of the title of their pages. The personalisation absent (PA) group did not make these changes. The fourteen Effects listed by the TPA were used as dependent variables. To maximise the effects of personalisation, all three personalisation items that were found to have a significant or close to significant effect on the Effects in the previous chapter (see Section 9.3.4) were used in the present experiment. These included other personal photos, i.e., personal photos not portraying oneself, non-default font, and title graphics. The figures below illustrate the web sites in the two conditions. The web sites represent the sites that were constructed by the author when running the sessions.

Jan Blom

I'm Jan Blom and I'm currently doing a PhD at the University of York, UK.
I'm originally from Finland, Helsinki. I've lived in the UK for a few years now.

Hobbies:	Activities
• Skiing • Chess	• Pubs • Hotel work in the evenings(?!)

Some useful links:	1. Click here to access University of York web site 2. I often visit Yahoo if I want to search stuff 3. My favourite news service is CNN

My contact details:
Department of Psychology
University of York

Send me email!

Figure 10.1. Example screenshot of the site constructed in the PA condition.

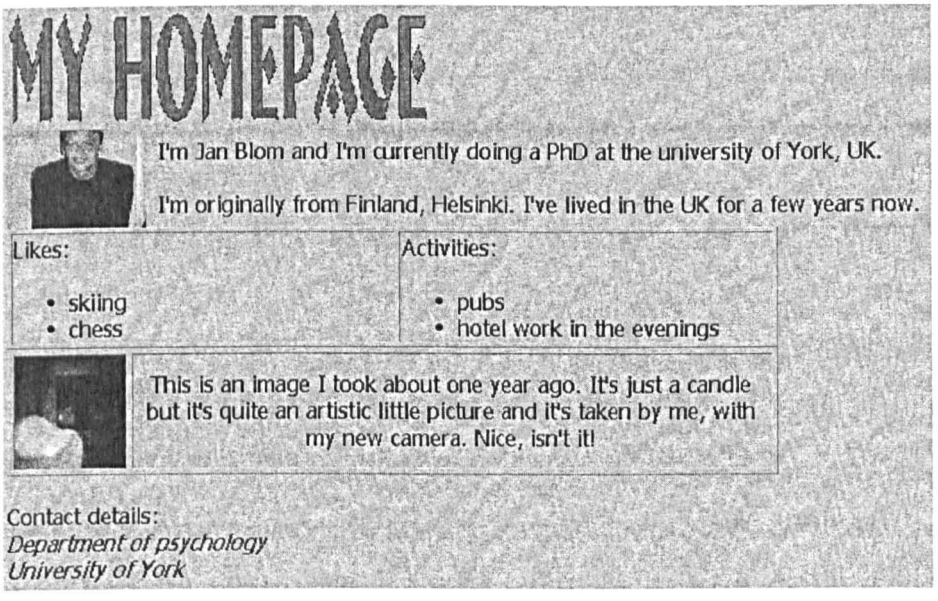

Figure 10.2. Example screenshot of the site constructed in the PP group.

As indicated by the figures, the elements that were incorporated on the sites were almost identical to each other. The aspects that were kept constant through the conditions were title, a 'who am I section', table of hobbies and interests, and contact details. To balance

for the participants in the PP condition inserting images and changing the font type and background colour of their sites, the individuals in the PA condition created a table of useful hypertext links and a 'mailto' link.

The table below illustrates how the personalisation process was manipulated in the experiment.

Personalisation item	Personalisation present	Personalisation absent
Title graphics	Personalised image created in Session 1 inserted	Title inserted by adding text into the source code
Background colour	Personalised	Default background (white)
Font type	Personalised	Default font type
Photo of self	Incorporated	Not incorporated
Other personal photo	Incorporated	Not incorporated

Table 10.1. Manipulation of the independent variable personalisation.

It could be argued that the personalisation process used in the experiment lacked ecological validity. The experimenter facilitated the personalisation process implying that the changes were not made spontaneously. Moreover, the time with regard to interacting with the site was short and the Effects were assessed immediately following the personalisation process. As a consequence, the experiment should only be regarded as a start in the process of investigating whether there are causal relationships between the elements of the TPA.

Experiment 3 built on the methods used in Experiments 1 and 2 to examine the effects of the personalisation of web sites. The difference was that the first two experiments were exploratory, whereas Experiment 3 served to confirm a theory. Moreover, the first two experiments assessed the effects of a range of personalisation techniques whereas Experiment 3 only focused on personalisation of appearance.

10.2 Method

10.2.1 Participants

34 subjects took part in the web site construction groups. The data of five participants was excluded from the analysis as they had either failed to appear in Session 1 or had experienced technical difficulties with displaying the photos on their web sites. Of the remaining individuals, 14 participated in the personalisation present condition (PP) and 15 in the personalisation absent condition (PA).

All of the participants were students at the University of York and they volunteered for payment or a course credit. To enable the programming skills of the participants to be balanced across the conditions, the entire sample consisted of users with no previous experience in web site construction. The table below illustrates the details of the participants. As can be seen, the attributes of the participants were well matched between the conditions. The values for the variables computer usage and web usage frequency are based on subjective estimates, assessed using the final questionnaire.

Group	Gender distribution (f/m)	Mean Age (min/max)	Course (psychology/ other)	Computer usage (novice/intermedi-ate/expert)	Web usage frequency (occasional/weekly/ daily)
PP	10/4	21.0 (17/41)	11/3	0/13/1	1/3/10
PA	10/5	21.1 (18/33)	11/4	1/13/1	2/4/9

Table 10.2. Participant details across the conditions. PP=personalisation present; PA=personalisation absent.

10.2.2 Procedure

The experiment consisted of two sessions. In Session 1 the participants in both groups met individually with the facilitator to have their personal photos scanned and to create a title for their home page. Session 2 consisted of the experimental session in which the participants were instructed to construct the web site.

An e-mail asking to submit details of age, gender, course and IT skills was sent to the individuals who had volunteered to take part in the experiment. The sample was split to two groups that were matched with each other with regard to these categories. The participants were contacted again to arrange suitable times for the group sessions. In the third e-mail, the time and location of the group session (Session 2) was given to the participants and they were also asked to come and see the experimenter before the experiment. The participants were told that this initial meeting (Session 1) was needed to set up the personal web user area for each individual so that the site could be published. All the participants were also asked to bring with them a picture of their friend or relative, which could then be used to decorate the site with.

10.2.2.1 Session 1

The participants were asked to visit the experimenter's office to set up the personal web user area. The meetings took place at a time chosen by the participants. First the participants signed a consent form, which also included a short introduction of the study. The experimenter then verbally informed the participants about the aims of the study. The participants were photographed with a digital camera. The images the participants had been asked to bring to the session were scanned. Individuals allocated to group PP were told that they would be asked to decorate their web sites with these two images. Participants in the PA condition, on the other hand, were informed that they would not be able to use the images on their sites but that they could accomplish this afterwards should they want to.

The individuals allocated to the PP condition were also asked to create a title for their web sites, using Corel Draw. The size of the title had to be 72 points but the participants were allowed to select the font type and colour themselves. These 'title images' were then saved on the floppy disk that had been used to store the photos of the participants.

The final stage of the session was to create a personal web account without which the participants could not create personal web user areas. Prior to leaving, the participants were given a form containing the time and place of the web site construction session. See Appendix 14 for the session protocol that was used by the experimenter.

10.2.2.2 Session 2

A separate session was arranged for the two conditions. Prior to running these, an email was sent to all the participants reminding them of the time and place of the final stage of the study. They were also asked to produce a list of hobbies and interests or alternatively a list of likes and dislikes, which could then be displayed on the site in Session 2. In addition to producing one of these lists, all the participants were asked to prepare a short 'who am I' section, which would be placed in the beginning of the site.

Session 2 took place in the computer class of the psychology department. A video projector was used to illustrate the various aspects of creating the web site. An assistant was also present in the sessions to enable the ones requiring assistance receive help as efficiently as possible.

When arriving in the classroom, each participant was given an instruction package (see Appendix 15 for PP condition instructions; Appendix 16 for PA condition instructions), and a questionnaire. A floppy disk containing a predefined HTML file, images of the participants and the titles they had created was also given to the participants.

The session started by asking the participants to read the first page of the instruction package, which contained the aims of the session. The facilitator emphasised that the participants should not feel pressured; the quality or appearance of the web sites they were about to create would not be assessed. Instead, the study was about finding out how the participants would perceive their sites. The participants were also encouraged to publish the web sites they would end up creating. Directions how to do this were given at the end of the session.

The experimenter used a few minutes to explain the basic aspects of HTML. Most of the session, however, consisted of constructing the web sites. A pre-defined format, as specified in the instruction package, was followed, to enable the teacher to demonstrate the aspects needed to create the site through the video projector. One aspect at a time was taught to prevent anyone from falling behind. The HTML files that were used contained

some predefined elements of the page, such as the header, title and body tags. The HTML files also included the tables that were used. The code that was added to the file during the session was either typed directly or inserted with the help of HTML wizards.

When the steps to construct the home page had been completed, the participants were asked to spend five minutes fine-tuning their sites. The participants were asked to aim for such a presentation and quality that they would be happy to publish the site. The participants were not required to make their sites live, however. The disposition to publish the site was assessed in the questionnaire, which was given to the participants at the end of the session.

After filling in the questionnaires, the participants were briefed in regard to the aims of the experiment. The sessions for the two groups lasted each one hour. See section 10.2.3.2 for an illustration of the format and appearance of home pages for the two groups.

10.2.3 Questionnaire

The Effects of the personalisation process were assessed using a questionnaire at the end of Session 2. Each TPA Effect was represented with one question, assessed with a 5-point Likert scale ranging between 'totally agree' and 'totally disagree'. Table 10.3 lists the mapping between the Effects and the questionnaire items. See Appendix 16 for the full questionnaire.

Effect of personalisation from TPA	Questionnaire item used to assess the Effect
Cognitive Effects	
Ease of Use	The site is easy to use
Improved Aesthetics	The site is aesthetically pleasing
Recognition of S	The site is easy to recognise
Familiarity with S	The web site feels familiar
Enduring Emotional Effects	
S Feels Personal	The site is personal to me
Feeling in Control	I am in control of the site
Feeling of Ownership	I feel ownership over the site
Attachment to System	I feel attachment toward the site
Reflection of Personal Identity	The site reflects my personal identity
Reflection of Group Identity	The site reflects the group of individuals I associate with
Transient Emotional Effects	
Release from Boredom	Personalising the appearance of the site is something to do when you are bored
Fun	Personalising the appearance of the site is fun
Positive Associations	Personalising the appearance of the site brings about positive feelings
Accommodating Current Emotional State	Personalising the appearance of the site enables me to reflect my mood

Table 10.3. Assessment of the TPA Effects in Experiment 3.

10.3 Results

The table below illustrates the descriptive statistics for the individual categories that were assessed in the questionnaire. The mean composite scores for the groups Cognitive Effects, Enduring Emotional Effects, and Transient Emotional Effects are included in the table. In all of the items, the numbers of participants in the PP and PA conditions were 14 and 15, respectively. A high score indicates a positive holding to the particular feeling or category.

Between subjects t-tests were performed on the individual and composite means to determine whether the scores in the PP and PA conditions differed from each other. The results of these tests (equal variances assumed) are presented in the last two columns of Table 10.4. A positive t-value implies that the score for the PP condition in that particular item is higher than that associated with the PA group.

Dependent variable	Group	Mean (SD)	Min/Max	t (n=29)	p
Cognitive Effects (Composite)	PP	3.85 (.56)	3.00/5.00	1.56	.131
	PA	3.53 (.56)	2.25/5.00		
	Total	3.69 (.57)	2.25/5.00		
Ease of Use	PP	4.43 (.51)	4/5	-2.15	.041*
	PA	4.80 (.41)	4/5		
	Total	4.62 (.49)	4/5		
Improved Aesthetics	PP	3.29 (.99)	2/5	2.21	.036*
	PA	2.53 (.83)	1/4		
	Total	2.90 (.98)	1/5		
Recognition of System	PP	4.07 (.62)	3/5	2.89	.008*
	PA	3.13 (1.06)	2/5		
	Total	3.59 (.98)	2/5		
Familiarity with System	PP	3.64 (1.08)	2/5	.06	.954
	PA	3.67 (1.11)	1/5		
	Total	3.66 (1.08)	1/5		
Enduring Emotional Effects (Composite)	PP	3.87 (.62)	2.67/5.00	2.08	.047*
	PA	3.41 (.57)	2.50/4.33		
	Total	3.63 (.63)	2.50/5.00		
Reflection of Personal Identity	PP	3.64 (1.22)	2/5	1.57	.129
	PA	2.93 (1.22)	1/5		
	Total	3.28 (1.25)	1/5		
Reflection of Group Identity	PP	3.00 (1.18)	1/5	1.85	.075
	PA	2.20 (1.15)	1/4		
	Total	2.59 (1.21)	1/5		
System Feels Personal	PP	4.71 (.47)	4/5	3.03	.005*
	PA	4.00 (.76)	3/5		
	Total	4.34 (.72)	3/5		
Feeling in Control	PP	4.00 (.78)	2/5	.26	.797
	PA	3.93 (.59)	3/5		
	Total	3.97 (.68)	2/5		
Feeling of Ownership	PP	4.07 (1.00)	2/5	.01	.990
	PA	4.07 (1.03)	2/5		
	Total	4.07 (1.00)	2/5		
Attachment to System	PP	3.79 (1.12)	2/5	1.09	.285
	PA	3.33 (1.11)	1/5		
	Total	3.55 (1.12)	1/5		
Transient Emotional Effects (Composite)	PP	4.01 (.37)	3.50/4.75	1.95	.062
	PA	3.72 (.45)	2.50/4.50		
	Total	3.86 (.44)	2.50/4.75		
Release from Boredom	PP	2.71 (.91)	1/4	.97	.341
	PA	3.07 (1.03)	1/4		
	Total	2.90 (.98)	1/4		
Fun	PP	4.50 (.52)	4/5	.173	.864
	PA	4.48 (.51)	4/5		
	Total	4.48 (.51)	4/5		
Positive Associations	PP	4.64 (.50)	4/5	1.48	.15
	PA	4.33 (.62)	3/5		
	Total	4.48 (.57)	3/5		
Accommodating Current Emotional State	PP	4.21 (.80)	3/5	3.591	.001*
	PA	3.00 (1.00)	1/4		
	Total	3.59 (1.09)	1/5		

* P is significant at .05 level

Table 10.4. Means, standard deviations, minimum and maximum scores for each Effect of personalisation, across the conditions.

In addition to the items acquired from the TPA, also the willingness to publish the site was assessed. In this item, the means (and SDs) were 4.07 (1.07) and 3.60 (1.35) for the PP and PA groups, respectively.

When looking at the descriptive statistics, one can notice that items Ease of Use, Fun, and Positive Associations were associated with high scores: the respective means for these items are 4.62, 4.48, and 4.48. These figures point toward a ceiling effect. The scores on the rest of the items are on an acceptable level.

There were significant between-group differences in the categories Ease of Use [$t=-2.15$, $p<.05$], Improved Aesthetics [$t=2.21$, $p<.05$], Recognition of System [$t=2.89$, $p<.05$], System Feels Personal [$t=3.03$, $p<.05$], and Accommodating Current Emotional State [$t=3.591$, $p<.05$]. The direction of the scores was inconsistent with the theory in the category Ease of Use in that the participants in the PA condition perceived the site as being easier to use than did the subjects in the PP condition.

The inconsistency between the hypothesis and the direction of the scores in the item Ease of Use could be attributed to between-groups differences in the HTML that was used to construct the sites. Perhaps the images, colours, and font types were more difficult to implement than the corresponding control code that was used among the participants in the PA group, i.e., the code for hypertext links. It is thus possible that the deviation in the difficulty of HTML between the two groups affected the perception of ease of use of the actual sites. Regardless of what caused the difference, the scores for this item in both groups were high, 4.43 and 4.80 for the PP and PA groups, respectively. As stated previously, this suggests a ceiling effect: participants in both groups perceived the site as being easy to use.

The directions of the scores in the other items where a personalisation effect was observed were consistent with the TPA: the personalisation condition was associated with a stronger perception of the site as being aesthetic, recognisable, and personal, and allowing the user to reflect current emotional state, as compared to the personalisation absent group. The personalisation effect was weak in that the PP group was associated with a higher score on only four of a total of fourteen Effects. One should consider, however, that the focus was not on genuine, self-initiated personalisation, but rather, on

laboratory-based, instructed personalisation. Another factor that may have reduced the validity of the phenomenon of interest is that the effects of personalisation were assessed at an early stage of the 'personalisation life cycle'. Perhaps the impact of this process would have been more pronounced had the Effects been recorded after a longer period of interacting with the system and incorporating changes to the system. A third factor influencing the relatively small proportion of items associated with between group differences is that all of the participants were new to HTML. Learning the basics of HTML could have therefore increased the emotional engagement equally for all of the participants, irrespective of the condition they were assigned to.

Given that we accept the present experimental design had a negative effect on the validity of the personalisation process and that learning a new skill masked the effects of personalisation to some extent, the results were satisfactory in that there a personalisation effect was observed on one third of the Effects. The results on the composite scores supported this conclusion. The individuals that personalised exhibited stronger Enduring Emotional Effects [$t=2.08$, $p<.05$] as compared to the ones not personalising. Similarly, there was a strong trend with the similar direction for the composite index Transient Emotional Effects [$t=1.95$, $p=.062$]. There were no significant differences in the composite index Cognitive Effects. However, given that the explanation in the above paragraph regarding the item Ease of Use is accepted it would seem appropriate to remove this item of the composite index. This exclusion actually resulted in the PP condition being associated with a significantly higher composite Cognitive Effect score than the one associated with the PA group [$t= 2.19$, $p<.05$].

Finally, there we no significant differences in the mean scores for the item Publish. That is, the participants' willingness to make the sites live was similar across the conditions.

10.4 Discussion

The personalisation present condition was associated with a stronger perception of the site as being aesthetic, recognisable, and personal, and allowing the user to reflect current emotional state, as compared to the personalisation absent group. The differences in these attributes produced a significant difference in the hypothesised direction in the composite scores for Enduring Emotional Effects and a strong trend in the composite scores for Transient Emotional Effects. Opposite to what was hypothesised, the participants

personalising the site perceived the site as being easier to use than did the ones that did not personalise. This was thought to have been caused by differences in the difficulty of the HTML the participants used. Whether or not this was the case, there was a ceiling effect in the scores of this variable, indicating that it should be ignored. Removing the item Ease of Use from the composite scale Cognitive Effects resulted in the participants in the PP condition exhibiting stronger Cognitive Effects than the ones in the PA condition.

The fact personalisation affected Enduring Emotional Effects to a greater extent than the Transient Emotional Effects was surprising. One would have expected a converse direction given the fact that the Effects were assessed almost immediately after the process of constructing the web sites. Although Enduring Emotional Effects may be expected to last longer than the Transient ones, this does not imply, however, that the former Effects are not relevant on a shorter time-span. There might be an even distribution of Emotional Effects following the process of personalisation, with the exception that the Enduring Emotional Effects are expected to be more enduring.

There were significant differences or strong trends for statistical difference between the conditions in attributes from each super-category, in the hypothesised direction. The general effect was, however, weaker than expected in that two thirds of the effects failed to produce hypothesised differences. None of the users had ever used HTML before. Moreover, they all managed to produce a web site at the end of the session, which might have resulted in an emotional reaction irrespective of the condition. As discussed in Section 9.3, this would have consequently reduced the effects of the manipulation of the IV. The absence of a personalisation effect in the category Familiarity with System could be explained by the fact that all of the participants were unfamiliar with HTML. Having to get to grips with a new programming language to produce the site might therefore have reduced the effect of the IV. Similarly the items Control and Ownership might have been influenced by the insecurity in the use of this new skill.

Another general explanation for the reduced effect of personalisation is that the experimental paradigm reduced the validity of the phenomenon of interest. The personalisation process was not as genuine and spontaneous as it could have been as a predefined format of constructing the sites was used. This could explain the lack of between group differences in the items Reflecting Personal Identity and Reflecting Group Identity. Also, the users did not have a chance to spend a very long time using the site. Their perception was assessed at a very early stage of the system use. This would explain

the lack effect of personalisation in the categories Attachment and Release from Boredom, both of which are Enduring Emotional Effects.

When taking the above into account, if the causal structure of the TPA is to be further studied in the future, it is important to adopt a more spontaneous form of personalisation as the object of the experiment. This will remain a problem, however, if the experiment is carried out in a laboratory setting, a context where spontaneous personalisation is difficult to achieve. An appropriate balance needs to be found between the experimental paradigm that is used to verify the causal relationships and the behaviour, which takes place spontaneously, over a long time period, and in a naturalistic setting. The present experiment is best viewed as an exploratory attempt toward finding this balance. When estimating the experiment from this perspective, one could conclude that the experimental paradigm may be suitable because personalisation effects were observed. An appropriate direction for future studies in this area is to adopt a personalisation process that could take place without the explicit instructions given by the experimenter. A promising context would be to observe 1st year undergraduate students as they create user accounts and personalise the desktops of the computers they use at the department.

To sum the above, there were two main constraints associated with the experiment. First, the personalisation effect was masked by the emotional reaction caused by learning a new skill, web site authoring. Second, the validity of the personalisation process was constrained by the lab-based, instructional nature of the process and the short time scale associated with personalisation. Given these limitations, the personalisation effect on one third of the Effects is a respectable result and points toward the feasibility of the paradigm adopted. A stronger effect of personalisation could be expected if the personalisation process was made easier and more genuine and if the participants were allowed to develop a more enduring relationship with the system. Attempts to conduct a similar experiment but with a personalisation process that overcomes the criticism presented here raise possibilities for future research.

When it comes to the main question of this experiment, namely the question of whether personalisation Behaviour leads to Effects, one could argue that, while the experiment should mainly be viewed as an exploratory one, the results nevertheless support the notion of causality. Personalisation produced significant differences in four of fourteen Effects and significant or close to significant differences in the composite item scores for the super categories Cognitive, Enduring Emotional and Transient Emotional Effects suggesting that a causal link can indeed be established between Behaviour and Effects. It

remains to be seen whether improvements to the experimental method lead to stronger results and whether a similar causal link can be established between the Dispositions and Behaviour.

Chapter 11. Summary, discussion and conclusions

11.1 Introduction

There were two main questions that shaped the thesis research. First, how can the user experience associated with the use of personalised electronic products be characterised? Second, what methods can be used to study this area of interest? Each of the three parts resulted in distinct theoretical and methodological findings shedding light on these questions. The main import of the thesis was the TPA. Other theoretical issues that were covered were the interplay between personalisation and personification and the implications of interacting with a RS. Several methods were used including controlled web-based experiments, grounded theory analysis of interview data, and questionnaire-based research.

This chapter draws conclusions on the research. The main interest is to identify the issues associated with the thesis that contribute to the knowledge of the research community. Section 11.2 presents a summary and conclusions of the three parts of the thesis. 11.3 concentrates on discussing the methodology that was used throughout the thesis, whereas 11.4 focuses on the design implications and future research issues associated with the TPA. 11.5 draws general conclusions on the thesis.

11.2 Summary and conclusions on Parts 1, 2, and 3

Separate sub-sections are devoted to each of the three parts of the thesis.

11.2.1 Part 1

Experiments 1 and 2, Part 1 of the thesis, were exploratory attempts to answer the question: how can the user experience associated with personalised interfaces be characterised? A range of dependent variables was used. The main ones included mental workload, engagement, impressionistic trust, and emotional involvement. The design of

these experiments was to a great extent the same. The participants were asked to interact with a fictional online bank in a between subjects paradigm. A variety of different personalisation features were used, nine in each experiment, that ranged between user-initiated and system-initiated. Personalisation had two conditions, present versus absent.

Personification, the degree to which the interface exhibits human-like attributes, was also used as an independent variable. Personification had two levels in Experiment 1, human interface versus system-like interface. In the former condition, a service handling the data submitted by the customer was introduced to the user and the dialogue style was consistent with the idea of the team interacting with the user. In the system condition no indication was given as to who the user was interacting with, the dialogue style was short and the images the site contained did not include humans. A third condition was added to the IV personification in Experiment 2, namely an agent condition. Zingo, a cartoon character with a distinctive and informal personality, guided the user through the interaction.

The main finding of Experiment 1 was that personalisation and personification interacted: personalisation was associated with a reduced workload and increased engagement in the personification present condition. A possible cause for this interaction was thought to lie in the notion of human-like functionality, i.e., personalisation, becoming more engaging and easy to use when coupled with a human-like interface, i.e., personification. Alternatively, the socially related aspects of personalisation, i.e., changing the appearance of the site, and of personification, i.e., the human audience, perhaps made the users relaxed and engaged. A socio-emotional dimension would have been added to the interaction process resulting in the conjunction of personification and personalisation producing the most optimal effects.

The main import of Experiment 2 was that personalisation increased impressionistic trust toward the service and emotional involvement associated with the interaction process. The specific emotional attributes that were affected include cheerfulness, delightedness, satisfaction, and tolerance. A factor that indicates reliability of personalisation inducing emotional involvement is that personalisation was consistently associated with the more positive end of each emotion pair.

It was argued that the main effect of personalisation on impressionistic trust was based on personalisation being an inherently intelligent feature of the system, a feature easily associated with a perception of trust. The effect of personalisation on the various emotion

items, on the other hand, may have been caused by the ability of the participants assigned to the personalisation present condition to influence the appearance of the interface.

The interaction effects observed in Experiment 1 were not replicated in Experiment 2. Engagement and workload were not affected by the manipulation of the two IVs. The failure to replicate the interactions led to two interpretations. First, perhaps there were not really any interaction effects associated with Experiment 1, but these would rather be attributed to type one error due to the large number of variables assessed. Second, it may be that each personalisation feature is associated with its specific implications. The differences in the results between the experiments could have therefore been attributed to the differences in the ranges of personalisation features utilised: there was an overlap of only 5 of 9 features between the experiments.

A question associated with both experiments was whether the effects of personalisation were based on a combined effect of the whole range of personalisation features or whether individual personalisation features caused the effects? This provides an interesting avenue for future research. For instance, one could investigate the notion of the combined personalisation effect by dividing personalisation to several conditions as a function of number of features used. The existence of a combined personalisation effect would thus imply that the effects of personalisation should increase in magnitude when increasing the number of personalisation features utilised.

Experiment 1 led to the conclusion that, at least under some circumstances, the effects of personalisation on a user's subjective experience of interacting with a web site *can* depend on the degree of personification. In this particular study, personalisation had a positive impact on engagement and workload when it was coupled with a personified interface. It remained to be seen whether there are any other variables on which the conjunction of personalisation and personification has a similar impact.

The main conclusion of Experiment 2 was that at least under some circumstances, personalisation *can* induce positive effects, such as impressionistic trust and emotional involvement, irrespective of the level of personification.

The two conclusions were not consistent with each other: Experiment 1 suggested that personalisation technologies may benefit from the use of personification, whereas Experiment 2 lead to the conclusion that personalisation may produce positive effects, regardless of whether the interface is personified or not. In general, these two studies represented an initial empirical attempt to operationalise the impact of personalisation on user experience. Relative to the stage of the research, it was not surprising that

inconsistencies arose. One should also note that the studies raised more questions than they answered to and that there were many problems associated with the methodology. For instance, what other effects does personalisation have on the user? Moreover, individual differences, such as IT expertise or gender, or changing the banking context to, say, shopping may well play a role here. Finally, carrying through the studies with a narrow user population using a somewhat unprofessional web site design and a fictional scenario restricted the generality of the findings.

Problems aside, in neither experiment did personalisation have a negative effect on the variables that were assessed. The general conclusion of Experiments 1 and 2 is therefore as follows. Under some circumstances, the incorporation of personalisation features in a web-based electronic service can have beneficial user effects. It may be that in certain circumstances personalisation should be accompanied by personification to enable these effects. The qualities on which personalisation and personification may have a positive impact include at least mental workload, engagement, impressionistic trust, and emotional involvement. Further research is needed to identify what other factors play a role in shaping the perception toward personalisation. It is presently also unclear whether personalisation features have a combined effect on the user experience or whether the features are associated with their specific implications. Finally, it remains to be seen whether the context of personalisation and individual differences play a role on the user effects of personalisation.

11.2.2 Part 2

The conclusions stated above raised many issues for future research using the same experimental web-based paradigm. For instance, one could continue the web-based approach to investigate whether there is such a thing as a 'combined personalisation effect' or whether there are any individual differences factors that play a role in personalisation.

Changing the research paradigm from quantitative to qualitative and focusing on individual personalisation features in Part 2 was, however, well justified. The change was consistent with both of the interpretations regarding the cause of the failure to replicate the interaction effects observed in Experiment 1 in Experiment 2. To accommodate the first, i.e., the type one error explanation, a qualitative research approach was taken. The type

one error was hypothesised to have been caused by the exploratory nature of the experiments, i.e., by the assessment of an unnecessarily large number of DVs. The shift to qualitative research took place to enable the construction of a theory, which could then be used to generate a controlled number of variables for studies of confirmatory nature in Part 3. In line with the second interpretation, rather than investigating the combined effects of a variety of personalisation features, the focus was shifted on two personalisation features only.

There was also a practical reason for changing the research paradigm. The resources for constructing realistic system-initiated personalisation features were not adequate. Continuing to experiment on the self-created personalisation features would have therefore decreased the ecological validity of the research. Given this constraint, it was natural to shift the focus on real and professionally designed applications.

Part 2 selected as its focus collaborative filtering and personalisation of appearance. The most extensive study here was the Two-stage study, where Session 1 consisted of individually introducing the participants with web sites equipped with these two features. In Session 2, the participants attended one of seven discussion groups where the implications of using these personalisation features were discussed. GTA was used to derive user-centred theories for the two features.

The Theory of Personalised Recommendations described factors that influence the disposition of an individual to use the recommendations. Seven main categories emerged. First, Anthropomorphism toward the RS and the computer in general had a negative effect on the RS usage disposition. These individuals would regard the system as categorising them and they were referred to as instinctive because it was often the case that they could not explain their negative holding toward the system.

Second, the Instrumental View implied that the recommendations were considered as the results of an algorithm performed by a non-sentient entity. The users projected a functional status on the predictions.

Third and fourth, the Attitude toward the recommendations was either Serious or Playful. Serious users would have used the information for making decisions. Trust would only be evoked if the predictions turned out to be accurate. Individuals possessing a playful attitude perceived the system as being associated with entertainment value. They would often use the service to test the ability of the system to predict the preferences of the user but they were not likely to use the RS for information retrieval-related purposes.

Fifth, a need for Presence of Complementary Information was apparent among the participants. Some individuals would bear in mind or take into consideration the predictions but a decision to watch a film was made only after consulting complementary information.

Sixth, Knowledge of the Algorithm that is used by the system to produce the recommendations was needed. Seventh, there was a need to be in Control over the interaction with the RS. Changing the way the information is presented was suggested to contribute to this. Instead of telling the user, the nature of the recommendations should evoke a feeling of the system narrowing down the possibilities.

The Theory of Personalised Recommendations represented the only attempt in this thesis to investigate the user implications of RSs. It led to several potential future research avenues. One could increase the generality of the theory so that it could be safely applied to other types of RSs, other user populations, and other objects of recommendation. The theory also generated an experimental paradigm. The structure of the theory is simple – dispositional issues lead to use of the system. It is likely that trust toward the recommendations is a prerequisite for the use of the RS. Consequently, one could vary the degree to which the seven dispositional factors appear in a RS and determine the effect of this manipulation on the trust an individual places on the system. Trust would be a more suitable dependent variable than the use of the system, as the latter could feasibly be measured only with the help of hypothetical questions, such as 'Would you like to use this system?'. Research of this kind has commercial potential; the methodology could serve as a basis for constructing a trust-inducing RS.

The TPA included 34 categories. 18 were identified as main categories, and 16 as subcategories. In the TPA, User, System, and Context-dependent factors influence an individual's Disposition to personalise any given device. The greater the degree to which these Dispositions are present, the greater a need or disposition an individual has to personalise the appearance of the device. Personalisation Behaviour leads to Effects, which are divided to Cognitive and Emotional super-categories.

Two follow-up studies were devised to increase the generality of the theory across user groups and devices. The application areas that were chosen included mobile phones and PCs, as they both tended to be commonly personalised. In the Finnish study, three discussion groups were run on mobile phone personalisation in a high school in Helsinki. The theory was revised in the light of the new data thus improving the generality of the theory. The transference of the categories between the Two-stage and the Finnish study

was found to be high. An additional aspect in the study was to have external judges categorise the discussion group transcripts. The categories produced by the judges were found to match well the corresponding categories produced by the coder/analyst. This indicated a high inter-rater agreement regarding the TPA.

In the second follow-up study, home computer users were visited in their homes. The study aimed to refine the theory by introducing a novel context of personalisation. Only one category was added to the system, i.e., 'New to System'. This indicated that the theory had reached a high level of generality. Of interest was also how people personalised their devices and whether the TPA could be used to predict Personalisation Behaviour. The main conclusion in regard to the former question was that there was considerable variation in the magnitude of personalisation of home computers. The implications of personalisation differed as a function of the magnitude: Extensive Personalisers provided more emotional descriptions of this process than Occasional Personalisers and those belonging to the No Personalisation group. The degree to which the participants had personalised their PCs was found to be well predicted by the Dispositions in the theory, suggesting that future research on systematically testing the correlation between the TPA elements was viable.

11.2.3 Part 3

The final part of the thesis validated the TPA empirically. Chapters 8 and 9 described a questionnaire study that was used to assess whether perceptions and behaviour with regard to personalisation of appearance correspond to the theory. Two personalisation areas were focused on, home pages and desktops of university computers. Staff members and students from the University of York filled in a web-based questionnaire.

Chapter 8 presented a factor analytic refinement exercise that was performed on the Effects of the theory. The interest was to acquire an indication of whether the super-categories that were created to classify the Effects corresponded to the way the Effects correlated with each other. The main division inherent to the original TPA, i.e., that between Cognitive and Socio-emotional Effects, was confirmed by the factor analyses. The super-categories were nevertheless modified in that the socio-emotional attributes formed clusters not predicted by the theory. The new factors were Transient and Enduring Emotional Effects. This implies that personalisation of appearance affects the user at the

time of the personalisation process. Effects relevant in this context include Fun, Positive Associations, Release from Boredom and Accommodating Current Emotional State. Enduring Emotional Effects implies that the process also has longer-term emotional implications including Reflection of Personal and Group Identity, System Feels Personal, Feeling in Control, Attachment to System, and Feeling of Ownership. Another, more minor modification of the theory was that Feeling of Familiarity was shifted to the super-category Cognitive Effects.

Chapter 9 was associated with the main interest of the questionnaire, namely the question of whether the Dispositions, Behaviour, and Effects correlate with each other. Both home page and desktop personalisation correlations supported the dynamics of the TPA in that evidence was found of the Dispositions correlating with Behaviour and of Behaviour correlating with Effects. The associations were observed at both individual category-to-category levels and at the more general level of composite top-level construct correlations.

The questionnaire enabled a multivariate regression to be computed to determine which of the ten home page personalisation features that had been measured were particularly strong predictors of the super-categories Cognitive Effects, Transient Emotional, and Enduring Emotional Effects. Two personalisation items had a significant impact on the Effects. Personal photos influenced the scores on Cognitive Effects and Enduring Emotional Effects. A non-default font had an impact on the Cognitive Effects. Title graphics had a close to significant effect on Transient Emotional Effects. Although only a few items predicted the Effects, each of the super-categories was associated with distinct patterns of relevant items. On a more general level, the findings led to the conclusion that the items that are used to decorate the system may vary in terms of the Effects they induce in the user. In the context of home page personalisation, particularly effective items could be personal photos, title graphics, and font type.

Correlational analysis on data acquired without time delays in between the measurement, although useful, does not allow conclusions to be made with respect to causal relationships between the pairs that correlate with each other. Chapter 9 showed that Dispositions, Personalisation Behaviour, and Effects correlated with other, but it was not possible to make conclusions as to whether there was a causal relationship between the elements. Investigating whether the Dispositions cause Behaviour and whether Behaviour causes Effects provided yet another way of validating the theory. The final study, Experiment 3, explored the issue of causality by examining whether the ability to

personalise the appearance of a home page influences the magnitude of Effects. The idea, in addition to investigating the notion of causality of the TPA, was to return to the kind of experimental web-based research methodology that was incorporated in Part 1. The difference between these two contexts was that Experiment 3 served to confirm an existing theory rather than to explore novel issues.

In a between-subjects design, two groups of novice HTML-users took part in a home page construction session. The content of the home pages between the two conditions was to a great extent the same. The appearance varied, however, as a function of the two conditions the participants were assigned to. The personalisation present group personalised the background colour, font colour, and title graphics of their home pages. They were also asked to decorate their sites with a photo of themselves and with a personal photo depicting a meaningful event or a friend. The personalisation absent group was not allowed to personalise these items.

The personalisation present condition was associated with a stronger perception of the site as being aesthetic, recognisable, and personal, and allowing the user to reflect current emotional state, as compared to the personalisation absent group. The differences in these attributes were enough to produce a significant difference in the hypothesised direction in the composite scores for Enduring Emotional Effects and a strong trend in the composite scores for Transient Emotional Effects. Some evidence was thus found for Personalisation Behaviour leading to Effects. The personalisation effect was not particularly strong but this was not surprising taking into account the fact that the effects were assessed quickly following the process of personalisation. Another issue possibly influencing the results was that the personalisation was not spontaneous. The features the participants changed took place as a function of the orders of the facilitator of the session.

The problems discussed above reduce the value of Experiment 3 to that of an exploratory investigation of the causal nature of the TPA. Evidence was found toward Behaviour causing Effects, but improvements need to be made with respect to the spontaneity of the personalisation process and with respect to time-scale of this process.

11.3 Methodology

As stated in the Introduction, one of the main aims of the thesis was to gain understanding on methods that may be suitable for examining personalisation from the

perspective of the user. The first step in a methodological analysis of this kind is to classify the research that was performed in the course of the thesis. The main methodological categories that were used include (1) Experimental personalisation simulation; (2) Applied GTA; (3) Validation. The table below provides a summary of each of the three areas. Column two indicates the chapters that were associated with the particular research category and column three lists the individual methods that were used within that research category. The two final columns describe the main advantages and disadvantages associated with the research categories. Note that the advantages and disadvantages that are traditionally associated with quantitative and qualitative methods are in most cases not listed in these two columns. Rather, issues specific to research on personalised interfaces are described.

Research category	Chapters	Methods used	Main advantages	Main disadvantages
Experimental personalisation simulation	2-3	Controlled experiments on a fictional online service incorporating personalisation	Control over personalisation feature Naturalistic setting (out of the lab)	Danger of type one error if exploratory Low ecological validity if system is fictional Construction of features laborious
Applied GTA	4-7	Two-stage approach	Ability to reflect on a technology one is not familiar with	Exposure to the demand characteristics of the study
		GTA on focus group and interview data	Ability to approach a novel area	Preconceptions of the coder/analyst
		Saturating the theory by changing user population and system	Increases generality of the theory	A theory may become too general if it applies on a range of contexts
Validation	5-10	Overlap of categories across two contexts	Provides indication of generality of theory	Relies on the fact that the coder/analyst is objective when starting to investigate the new context
		Agreement levels between theory and external judges	Provides an indication of the level of objectivity of the theory	Are there resources to expose the external judge to the data for a sufficiently long time?
		Questionnaire assessing real personalisation	Ability to investigate personalisation in a spontaneous context	Causality cannot be deduced if only one time-point for assessment
		Controlled confirmatory experiment on personalisation	Ability to identify causal relationships	Interruption too soon? How to make more spontaneous?

Table 11.1. Summary table of the three research categories that were utilised in the thesis.

The issues listed in Table 11.1 are discussed in the sections below that are devoted to each of the three methodologies.

11.3.1 Experimental personalisation simulation

The Experimental personalisation simulation method provided a suitable platform for approaching personalisation. Utilising an experimental paradigm enabled a high degree of control in regard to controlling for confounding factors. Using a web site to deliver the

personalisation features enabled the experiment to be carried out outside the lab setting, a characteristics that is rare in controlled experiments. The dynamic web content created using Coldfusion provided a flexible platform for the experimentation in that it enabled the experimenter to control for both the nature of the personalisation features and issues associated with the manipulation of the experimental conditions.

Because of the exploratory nature of studies conducted with this methodology, a large number of dependent variables were assessed. This increased the likelihood of committing type one error. This problem was avoided in Experiment 3, which served to confirm rather than to explore. From a practical point of view, the construction of the personalisation features was a rather laborious process and required programming skills.

Perhaps the biggest challenge with respect to the simulation paradigm is that the users of these fictional services know they are not real. This is likely to affect the perception toward the service, which in turn may reduce the ecological validity of the results. Placing emphasis on the design of the simulation may alleviate this. By making the system look real, the user experience associated with the interaction may become more realistic. The issue of simulation was avoided in Experiment 3, because it focused on the personalisation of a personal home page.

In summary, the Experimental personalisation simulation method is suitable for situations in which a high degree of control over the personalisation feature and independent variables is desired. The methodology also enables the experiment to be performed in a more naturalistic setting than the laboratory. It should be noted, however, that the development of the personalisation feature is a process that demands resources. A further problem with the simulation method is that the system that is studied is fictional. Designing the system to look as realistic as possible may alleviate this problem.

11.3.2 Applied GTA research

When viewing GTA in its traditional sense, a set of interviews or discussion groups is performed, the sessions are transcribed, the data is analysed, and the theory is derived. It could be argued that the GTA performed in the course of the current research was applied. The process of modifying the GTA methods to be optimally practical for the context contributed to the applied nature of the research. For instance, by the time of running the second follow-up qualitative study, the Home Computer study, there was no need to fully

transcribe the interviews because the theoretical understanding on the matter made it possible to filter out the irrelevant sections from the discussions. This does not imply that the coder/analyst only selected issues for further analysis that did not require modifications to be made to theory. Refining the category Reflection of Group Identity indicates that the coder/analyst was also open to novel, unpredicted issues.

A further factor contributing to the applied nature of the research was that contextual factors influenced the research. The nature of the personalisation process placed constraints on the methodology. A two-stage method was used in the initial stages of the GT research to overcome the issue of the participants not being familiar with the features that were studied, personalisation of appearance and personalised recommendations. As stated in Table 11.1, the disadvantage with the two-stage method is that, because of the individual meetings with the facilitator of the study during Stage 1, the participants may become exposed to the demand characteristics of the study, in this particular case the expectations and preconceptions of the facilitator. The exposure to the facilitator's preconceptions may be avoided if the facilitator is not involved in the coding and analysis of the data. This did not take place in the present research for practical reasons. The issue was alleviated, however, by using a protocol of questions and instructions for each stage. This made the influence of the facilitator constant for all individuals and groups.

Another contextual issue was the fact that the need to understand how individuals personalise their PCs affected the method of collecting the data. To optimise the ability to observe users' personalisation behaviour, individual interviews using the computers as a stimulus were performed.

The second method associated with the present methodology is the aspect of GTA that has to take place regardless of whether the research is applied. The data has to be acquired with the help of discussion groups or individual interviews. Both of these possibilities were used. The Two-stage study and the Finnish study used discussion groups whereas individual interviews were performed in the Home PC study. Here a general advantage of the GTA method is included in Column 4 of Table 11.1. GTA allows one to approach an area that is previously unfamiliar to the research community. The methods allow the theory to become grounded on the opinions of the stakeholders thus making it possible that no previous knowledge exists on the area that is approached. The danger is that the preconceptions of the facilitator and of the coder/analyst influence the way the data is acquired and interpreted. This issue was discussed in Section 7.4.3., with the conclusion being that the experimenter was aware of the negative influence of preconceptions and

that he did his best to avoid these when facilitating the discussion groups and when analysing the data.

The final method of the Applied GTA research listed in Table 11.1 is that of saturating the theory by changing the device and the user population studied. This took place to a great extent in that all three studies that were associated with conducting the GTA focused on a distinct context of personalisation and on a distinct user population. One could naturally question the issue of whether the TPA did in fact reach a point of theoretical saturation, as categories were included to the theory as a result of both two follow-up studies. A reasonable conclusion is that the TPA did not reach an absolute point of saturation: the theory is likely to be modified slightly with the inclusion of each new area of personalisation and user population. TPA is, however, mature enough to ensure that the extent to which modifications have to be made with each new area remains marginal in relation to the number of categories already present in the theory.

The above discussion leads to the idea of theoretical saturation being associated with two different meanings. The TPA may have reached a theoretical saturation in regard to web portals, mobile phones and home PCs. On a more general level, however, there is also the issue of theoretical saturation to account for novel contexts. The generality of a theory, say in the area of human computer interaction, may vary from being specific to a particular device and user group to being able to explain user perceptions across a range of devices and user populations. It could perhaps be concluded that TPA reached theoretical saturation for all three contexts of personalisation that were studied. On the more general level, TPA is likely to be quite saturated as well, because altogether three usage contexts were covered. In contrast, there is the Theory of Personalised Recommendations, which has been applied on only one area, collaborative filtering of movies. This theory, one could argue, has not reached general theoretical saturation.

To summarise this section, Applied GTA research provided an advantageous set of methods for making theoretical advances on a novel area of research, namely user implications of personalised interfaces. To account for the novelty of the personalisation features to the users, a two-stage method was adopted, which included a stage whereby the user was acquainted with the technology. To increase the generality of the TPA, several devices and user groups were studied. Both of these applied methods could be argued to be important in the context of HCI research, which is often associated with investigating previously unseen technologies and a wide range of usage contexts. When performing GTA, it may be useful to separate the persons facilitating the discussion

groups or interviews and the ones performing the coding and analysis processes. If this is not possible, one should try to keep the conditions between the interviews and discussion groups constant by, e.g., using an interview protocol.

11.3.3 Validation research

As Table 11.1 indicates, the TPA was validated rigorously, with the help of four different approaches. Systematic validation is not common, which in turn makes the validation processes described in the thesis an important contribution to the HCI community.

Determining the overlap between the categories present between GTA in two different contexts, a validation procedure that took place in the course of the Finnish study, provides a simple and efficient way of acquiring an indication of the level of generality the theory has acquired. It also provides the investigator with an indication of the rate at which the weights of the categories between different contexts are likely to change. The danger associated with this method is that the way the novel area is analysed is biased by the results of the original study. For instance, the coder/analyst may ignore issues that are relevant in the new area, in which case an estimate of the overlap would not be reliable. The objectivity of the coder/analyst is naturally one of the main requirements of successful GTA and thus extends beyond the notion of determining the degree of overlap.

The agreement levels between categories created by the coder/analyst and those created by external judges may be used to determine the extent to which the coder/analyst has managed to provide an objective estimate of the research area. This method may thus be used in conjunction with the overlap estimation method discussed in the previous paragraph. Having external judges categorise the data is associated with a pragmatic problem. Performing this procedure is time consuming and the question thus is: how to maximise the exposure of the judge to the data in the quickest possible way? There is a trade-off here between the quality of the categorisation process and the time used to categorise the data. It could be argued that the present research managed to reconcile these two issues in that the judges were asked to identify aspects in the data contributing to the main elements of the TPA, namely Dispositions and Effects. Providing the external judge with the generic structure of the theory is likely to speed up the interpretation process. The

problem is that this introduced preconceptions to the way the judges perceive the data. This issue can be overcome, however, by validating the general structure of the theory using some other method, such as the personalisation questionnaire in the present research.

The questionnaire that was issued was useful because it enabled the assessment of an area of personalisation where the process takes place spontaneously, without being induced by the experimenter. This takes us to the issue of contrasting laboratory-based research to field research. The former lacks ecological validity whereas the latter is associated with lack of control. An additional advantage associated with questionnaire was the ability to correlate perceptions toward personalisation with an objective behavioural measure of home page personalisation, namely Extent of Personalisation.

Sadly the questionnaire could not be used to validate the causal properties of the theory because the assessment took place at one time point only. An attempt was made to explore causality in the final validation study, namely the controlled experiment that explored whether Personalisation Behaviour leads to Effects. This approach resembled the Experimental personalisation simulation method described in Section 11.3.1 with the exception that the personalisation process was not a simulation. New problems arose here, however, namely that of having to induce the personalisation. The time-scale was also rather short, giving rise to the importance of assessing the entire life cycle of Personalisation Behaviour, not just the point in time associated with accomplishing the change.

The validation methods were used in a complementary fashion; many of the techniques covered issues that other techniques could be criticised of. For instance, producing a measure of overlap between the categories produced across two different contexts was constrained by the ability of the coder to achieve objectivity in the coding and analysis of the data. A complementary method was thus used to achieve an indication of the objectivity of the theory by generating an agreement index between categories generated by the coder/analyst and those produced by external raters.

In summary, the thesis incorporated a range of validation techniques, including measures of overlap of categories between studies, measures of association between coders, a questionnaire to examine the generic structure of the theory and an experiment to examine the issue of causality inherent to TPA. Each method had its specific shortcomings. The methods worked in a complementary fashion in this respect, thus making the use of as wide a range of validation procedures as possible recommendable.

To finish this section, the table below provides a summary of a few crucial issues specific to the research on personalisation and how these can be addressed with the help of the kinds of methods or studies that were incorporated in the present thesis.

Aspect of personalisation	Outcome	Research method / study used to approach the condition
Number of personalisation features studied	One	Applied GTA
	Many	Experimental personalisation simulation
Personalisation Process	Induced	Experiments 1-3, Two-stage study
	Spontaneous	Finnish study, Home Computer study, Personalisation questionnaire
Nature of personalisation	Fictional	Experimental personalisation simulation
	Real	Finnish study, Home Computer study, Personalisation questionnaire
Assessment	Immediate	Experiments 1-3, Two-stage study
	Long-term	Finnish study, Home Computer study, Personalisation questionnaire

Table 11.2. Summary how various research methods or studies performed in the thesis research relate to issues specific to the process of personalisation.

An issue relevant to personalisation research is whether one decides to concentrate on the combined effect a range of personalisation features or whether a more specific focus is more appropriate. The Experimental personalisation simulation methodology is recommended if one selects the former alternative because this methodology provides the investigator with control over the nature and range of personalisation features tested. The Applied GTA seems to be an appropriate way of approaching individual personalisation features, on the other hand, because this methodology ensures qualitative data to be collected on the exact nature of the implications of personalisation.

An essential thing in regard to successfully investigating personalisation is whether one manages to study this process in a spontaneous context or whether one has to induce the process. The former alternative is preferable as it allows the assessment of a realistic process. Inducing the personalisation, a process associated with Experiment 3, reduces the authenticity of the process and has a negative effect on the ecological validity of the study.

A related aspect is whether the personalisation feature studied takes place in a fictional or a real environment. An instance of the former is the Experimental personalisation simulation methodology, whereas the personalisation questionnaire and the qualitative

follow-up studies performed on mobile phone and desktop personalisation investigated personalisation in a real context.

The problems of inducing personalisation and simulating a real system are particularly prominent in controlled experiments where the high degree of control gives rise to these properties. It is possible, however, to alleviate these aspects in an experimental setting. The Experimental personalisation simulation methodology prompted the participants to imagine a usage scenario. Having a realistic task in mind when interacting with the simulation is likely to reduce the participants' perceptions of the system of being fictional. The problem of having to induce the personalisation process may be reduced by increasing the motivation of the participants to accomplish the process in the first place. For instance, Experiment 3 was associated with learning to construct a web site, a skill that is likely to be desirable.

The final issue in the table is that of when to perform the assessment of the process. Experiments 1-3 and the Two-stage study were associated with acquiring the data after the process of personalisation. The Finnish study, Home PC study and the Personalisation questionnaire, on the other hand, were associated with examining personalisation at a point in time at which the process has taken place over a longer period of time. One can identify goals for future research here: a dimension that lacks altogether from the present thesis is longitudinal research. Longitudinal studies would examine the issue of user perceptions toward the process of personalisation evolving as a function of time, thus contributing importantly to the theory.

11.4 Theory of Personalisation of Appearance

The TPA reached maturity and a number of procedures were performed to validate it. Therefore, it represents the most solid theoretical contribution of the thesis. This section discusses the theory in its final form and presents issues for future research. The design implications of the theory are also demonstrated by applying it on a platform not currently associated with this personalisation feature, namely supermarket self-service points. Figure 11.1 presents the TPA.

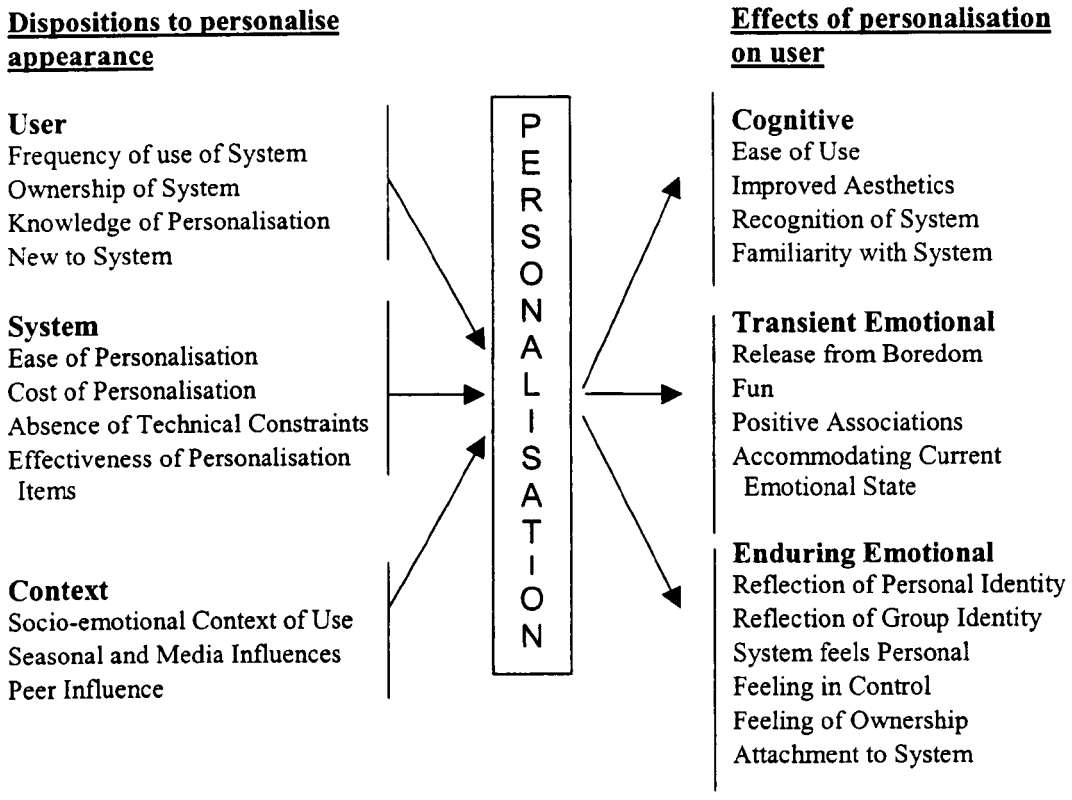

Figure 11.1. The TPA in its final form.

In TPA, User-dependent, System-dependent, and Contextual factors increase a person's disposition to personalise the appearance of an electronic product. Behavioural aspects, Frequency of Personalisation and Extent of Personalisation, lead to Cognitive, Transient Emotional, and Enduring Emotional Effects.

11.4.1 Future research

Although each chapter associated with the TPA listed questions in regard to the theory that remained open, it is useful to prioritise on these and highlight the issues that present the most interesting challenges for future research. Four aspects arise here.

First, the question of weights of the categories is an important one because it is likely that some categories are more important than others in different contexts. In line with this, it would be interesting to determine whether the presence of certain Dispositions is a necessary condition for the process of personalisation. One could expect that, say, Ownership of System and Frequency of Use of System are categories that need to be

satisfied before the decision to personalise takes place. When it comes to Effects, the theory of personalisation of environment (Heidmets, 1994) provides evidence toward the categories Feeling in Control, Feeling of Ownership, and Reflection of Personal and Group Identity being essential factors when personalising products. One would also assume that the weights of the categories change as a function of the device, usage context, user population, and factors associated with individual differences, such as gender, IT expertise, and various personality aspects.

Second, the theory does not currently explain the extent to which time has an influence on the user experience. One would assume that the perceptions associated with the process of personalisation evolve across the interaction span. Dividing the Emotional Effects to Transient and Enduring super-categories points toward the notion of time constituting a dimension in the theory. As discussed in the previous section, longitudinal studies where personalisation would be followed at several time points may yield interesting data in this respect.

The third question is associated with the dynamics of the elements in the theory. A common question through the TPA research has been the idea of certain Effects in the theory feeding forward to influence the Dispositions. For instance, the concept of ownership is present in both the Dispositions and Effects. Does this imply that personalising a product once increases the likelihood of personalising it again because of Ownership as an Effect feeding forward to Ownership as a Disposition? It could also be the case that ownership is associated with other factors present in the theory, including control and the feeling of personal, such that these would play a role also as a dispositional group. Another issue in regard to investigating the dynamics of the theory is the role of the Effects in the theory. It could be argued that the effect of any given behaviour has also acted as a motivational force behind the behaviour. Applying this notion on TPA, the Effects could also be regarded as motivations to personalise. Currently, the reason for only considering these factors as Effects is because the theory is grounded on how the participants saw the issues. It is unlikely that an individual explicitly reflects on issues that act as motivators; it may be easier to perceive these aspects as effects of the given behaviour. Further research is needed as to how exactly the role of the Effects in TPA should be determined. Does the role of these factors as both motivational factors and Effects have to be admitted and if so, how would this be reflected in the structure and dynamics of the theory?

Fourth, the issue as to how the TPA relates to one of the central issues in HCI, namely that of the user being involved with certain tasks to achieve particular goals when interacting with a system (cf., Norman, 1986), needs to be refined. As mentioned above, the 14 Effects listed in the TPA could be regarded as motivational issues. Similarly, could the Effects be equated with the goals of the user, or should a distinction be made between these concepts? One possibility would be to treat personalisation of appearance as the generic goal of the user and adopt, e.g., the GOMS method (Card and Moran, 1983) for breaking down the steps that are needed to achieve this goal. One should note, however, that the incorporation of such user modelling techniques would stand in contrast to the current object of the TPA, namely that of user perceptions toward personalisation of appearance. One could possibly expand the theory by using GOMS, while simultaneously being careful, however, not to confuse the perceptual levels (the original TPA) and the user modelling levels (GOMS) with each other.

11.4.2 Design implications of the TPA

TPA contributes to the design of electronic products. The general design implications of this theory were discussed in Section 7.4.2.2. This section shows how the theory may be used in a more specific context. A fictional example, self-service kiosks in supermarkets, is used to show the potential of the theory. Let us assume that the example system includes the following functionality:

- Money withdrawal
- Management of loyalty points
- Recommender system on products of the supermarket chain

The kiosk has been in use in every store of the chain for a year. The uptake of the use of the kiosk has not been high but the company in interested in developing the service because it sees commercial potential in it. The supermarket chain has hired a consulting company to develop the service. The specific user group that the service should be aimed at consists of 40-55 years old heads of families.

TPA contributes to the present problem in two ways. First, the Emotional Effects are positive attributes and may result in increasing the loyalty of customers. The Effects can thus be used in the initial stages of the development process, namely to identify

implications of the personalisation process that make the process desirable for a particular user population. The positive implications could then be used to make the managerial level of the supermarket chain convinced of the potential of the personalisation feature in increasing sales and customer loyalty toward the company.

Table 11.3 presents a checklist of Effects from TPA, adopted from Blom and Monk (in press). Using the checklist may enable the designers to identify the Effects that may be particularly desirable for the target user population.

1. Ease of use
2. Being able to change the aesthetics of the design to my preferences
3. Being able to recognise my copy of the product or system
4. Being able to reflect my personal identity
5. Being able to reflect my membership of some group
6. Feeling familiar with the system or product
7. The system of product feels personal
8. Feeling in control of the system or product
9. A feeling of ownership of the system or product
10. Being fed up with the appearance of the product or system and wanting to re-personalise it
11. Having fun with the product or system
12. Making me happy
13. Being emotionally attached to the system or product
14. Being able to accommodate my current emotional state

Table 11.3. A checklist of Effects for identifying Effects that may be of particular value to any given user population (Blom and Monk, in press).

The relevant Effects in this example include Ease of Use, Reflection of Personal Identity, Feeling in Control, System Feels Personal, and Fun, items 1, 4, 7, 8, and 11, respectively, in Table 11.3. Ease of Use is a desirable feature of all system use and it would certainly benefit the service. Ease of use is particularly important in the present example because the kiosk is aimed at users with little IT skills. For similar reasons, these users may benefit from an increased feeling of control.

Perceiving the system as personal may have implications on loyalty toward the company, a factor that is relevant in a commercial context. The ability to reflect personal identity with the help of the system is also an important Effect, as this would enable the company to overcome the negative effects caused by the impersonal nature of the supermarket context. Finally, fun may be an attribute consistent with the image the company wants to convey to the public.

The second design implication of the TPA is that it may be used to design the feature such that the need to personalise the appearance of, say, the desktop of the kiosk is maximised. To accomplish this, the Dispositions listed by the TPA need to be accommodated. The table below present ideas how to accommodate some of the categories. Not all of the Dispositions are included in the table because the facilitation of some of the categories in this context would be a mundane issue to discuss. For instance, Absence of Technical Constraints is accommodated if the kiosk allows the user to personalise the appearance of it, an issue hardly worth discussing here.

Disposition of TPA	Promoting the Disposition
Frequency of use of System	Issue loyalty points for frequent use
Ownership of System	Show that there is a parallel between personalisation of the kiosk and personalising one's home
Knowledge of Personalisation	Make the personalisation feature noticeable
Ease of Personalisation	Ensure the usability of the process
Effectiveness of Personalisation Items	User test personalisation items for effectiveness
Socio-emotional Context of Use	Include a communication function to the kiosk
Seasonal and Media Influences	Effective advertising
Peer Influence	Show how peers have personalised their accounts

Table 11.4. A list of possible actions that promote the disposition of an individual to personalise the appearance of the desktop of the kiosk.

The customers could be awarded with loyalty points for regular use of the service to increase the frequency of use of the kiosk. Ownership is a more problematic category to facilitate. Ownership of System may be increased if the parallel between personalising the kiosk and one's home is emphasised to the user, say, as part of the advertising of the service. The kiosk being a personal possession of the customer could be emphasised here. Knowledge of the personalisation process is likely to be achieved by making the personalisation feature noticeable.

When it comes to System-dependent Dispositions, Ease of Personalisation may be facilitated by ensuring the usability of the process of personalising the appearance of the kiosk. Especially the length and accessibility of the process may be important usability features. Effectiveness of the Personalisation Items is an important thing to take into account. One could incorporate participatory design here to allow individuals from the target user population to express opinions with regard to which features they find attractive.

To promote SEC, an extra functionality could be added to the kiosk. The use of the kiosk may become more social if it allows the user to communicate with other customers. One could, e.g., incorporate a bulletin board service for the customers for selling and buying second hand items. Seasonal and Media Influences may be promoted by running an advertising campaign on the service that would promote the ability to personalise the kiosk. A possible way of facilitating the Disposition Peer Influence would take place by allowing the customer to see a screenshot of how her peers have personalised their respective accounts. For instance, this could be achieved among family members using the same card.

In summary, applying it on the fictional example of personalising a self-service platform showed the design implications of TPA. The theory predicts that the greater the extent to which the issues discussed above are facilitated, the greater the need of a customer using the kiosk would be to personalise the appearance of the desktop of the kiosk. The process of personalisation would then consequently lead to Effects, which in turn may correlate with commercial factors such as customer loyalty and satisfaction.

11.5 Thesis conclusions

The thesis was concerned with investigating the psychological implications of personalised user interfaces. Issues that were investigated include the interaction between personalised and personified interfaces, and implications of the use of collaborative filtering to receive personalised recommendations and of personalising the appearance of an electronic product. The main import of the thesis was the TPA, in which User-dependent, System-dependent and Contextual factors increase an individual's disposition to personalise the device. The process of personalisation has Effects on the user, which can be divided to Cognitive, Transient Emotional, and Enduring Emotional ones. TPA

could be seen as a special instance of a wider theoretical framework within environmental psychology that aims to describe the process of man exerting control over his environment by personalising objects in his immediate surroundings. TPA has design implications in that (a) the nature of the Effects makes this feature recommendable and (b) facilitating the Dispositions influences the need of the users to personalise the system. The Dispositions may also be used to identify whether there is a need to incorporate a personalisation feature in the device.

Four main questions with regard to the TPA remain open leading to future research ideas. First, the weights of the categories are presently unknown and these may be influenced by factors such as device, context of use, and individual differences. Second, the user experience may evolve with time, giving rise to the importance of running longitudinal studies on personalisation of appearance. Third, the dynamics of TPA should be further studied. For instance, to what extent is the issue of feedforward between the Effects and Dispositions relevant and further, should the Effects also be regarded as motivational factors behind the process of personalisation? Fourth, the association between the TPA and user tasks and goals should be further refined.

Several research methodologies were used in the course of the research, including Experimental personalisation simulation, Applied GTA, and Validation studies. All of these made an important contribution to personalisation research because of the relatively unestablished nature of research methods in respect to user implications of personalisation. The main advantage of the Experimental personalisation simulation was that is increased the investigators' control over the nature of the personalisation features. The downside was that the experiments made the process of personalisation induced and fictional reducing the ecological validity of the results. Applied GTA provided a suitable way of approaching a previously unknown area, although the objectivity of the coder/analyst was an issue that needed to be maximised when conducting GT research. The TPA was rigorously validated, with the help of four complementary procedures.

Given that there is a growing trend in the use of personalised applications, across various contexts, it is surprising how little previous research there has been on how personalisation affects the user. Perhaps the most important contribution of the thesis has therefore been that it has opened a new research avenue within the study of adaptive and adaptable interfaces, namely that of promoting the user's perspective of these processes. Ultimately, research on the user implications of personalisation may give rise to a new

generation of personalisation technologies, a generation providing value both to the user and the company delivering the feature.

Appendices

Appendix 1: Experiment package (Experiment 1)

Web use study

University of York, 2000

To get started, please turn to page 1.

Web use study, general information

Thanks for volunteering to take part in this on-line study. This page contains general instructions. You should also read the instructions for each of the two sessions.

The experiment you are about to take part in consists of two sessions on the Internet. The first one is about filling in an application form to get an account at a fictional bank whereas in the second session you will be asked to use some banking functions, such as paying a bill. We hope this experiment will answer certain theoretical questions and so may inform future designs for e-commerce. Even though you are really only pretending, please take the tasks seriously and behave if it really were your bank account you were accessing.

Use the following URL to access each session:
http://www.york.ac.uk/res/ymcg/cfm/digibank/information.cfm

Your ID number:
Your password:

You may use any computer that has an Internet connection. If possible, use **Netscape** as the browser. **If you do the test at the psychology department, use the new iMacs in the MacLab.** If these are not available, you will have to enable the images by clicking the image-button on the browser.

It is important that you don't do these sessions within the same day. Try to leave at least one day in between the sessions. After each session, please fill in a short paper questionnaire (you will find these on pages 4 for session 1 and on pages 5 and 6 for session 2). When you have finished the last session, bring the questionnaires back to Jan Blom (Psychology department, room B112H), and he will reward you with 4 pounds.

If you have anything to ask regarding the experiment, you can contact Jan Blom (job103@york.ac.uk, ext. 3178) at any point. We'd also like to inform you that you are free to quit the experiment at any point.

Instructions for the first session

Type the following URL:
http://www.york.ac.uk/res/ymcg/cfm/digibank/information.cfm

Click on the link for session 1

On the login-page for this session, you will be prompted for your ID number and the password.

Your ID number:
Your password:

Once you are logged in, just follow the instructions.

The intention of the first session is that you fill in an on-line application for a bank account with Digital Bank. You will also be prompted to submit some additional information.

Once the main page of your account has been introduced to you, you may logout, using the quit session-link.

Fill in the questionnaire on page 4 after this session. Try to do this immediately after logging out.

Instructions for the second session

Logon to this session from the same address as in session 1. Your id number and password will be the same.

Try to imagine the following scenario for session 2:

You are going on a holiday in a few days time. You logon to Digital Bank's on-line account to accomplish the following tasks:

- You will need to know how much money you have on your account
- You are always on the lookout for a bargain, check the E-shop
- You want to buy a travel insurance for your trip
- You want to read the tips provided by the bank
- You also want to buy shares
- You have a bill to pay, with the following details:

Receiver	Receiver's bank	Receiver's acc. number	Switch code	Reference number	Amount
Orange	Lloyds	316678	40-45-16	32668	32.45

Feel free to use any links to accomplish the tasks above. **It is important that you complete each of the tasks.** You don't have to quit the session after completing the tasks. You may stay logged on and familiarise yourself with the site.

When you want to finish the session, click the quit session-link and follow the instructions.

After the session, please fill in the second paper questionnaire.
Bring the completed questionnaires to Jan Blom at Psychology dept, B112H. You will then be rewarded with the four pounds.

Questionnaire 1 (to be filled in after the **first** session)

1. Name: _____ 2. ID number in the experiment (if you remember): _____

3. Gender:_____ 4. Age: _____ 5.Occupation: _____

6. Computer experience: Novice/Occasional user/Expert

7. Web usage: Never/Occasionally/Weekly/Daily

8. Does your bank provide an Internet bank facility? Yes/No/Don't know

9. If yes, do you use this? Yes/No

10. How long would you estimate it took you to complete the first session (don't look at your watch)?

_____ minutes 11. What time is it now (do look at your watch)? _____

12. Where are you (computer cluster, bedroom, etc.)? _____

13. Did anyone help you during the session? Yes/No

14. Please place your opinion along the dimensions by placing a cross in one of the spaces:

How well were you concentrating? Not at all __ __ __ __ __ Very much

Was it hard to concentrate? Not at all __ __ __ __ __ Very much

How self-conscious were you? Not at all __ __ __ __ __ Very much

Did you feel good about yourself? Not at all __ __ __ __ __ Very much

Were you in control of the situation? Not at all __ __ __ __ __ Very much

Were you living up to your own expectations? Not at all __ __ __ __ __ Very much

Were you succeeding at what you were doing? Not at all __ __ __ __ __ Very much

Questionnaire 2 (to be filled in after the **second** session)

1. How long would you estimate it took you to complete the session (don't look at your watch)? _____ minutes

2. What time is it now (do look at your watch)? _____

3. Where are you (computer cluster, bedroom etc.)?

4. Did anyone help you with the session? Yes/No

5. Did you use the edit settings - link on the main page of your account?[1] Yes/No/Not sure

6. If yes, did you find these useful? Yes/No

7. Did you use the news-links on the main page of the account? Yes/No/Not sure

8. If yes, did you find these useful? Yes/No

9. Please place your opinions along the dimensions by placing a cross in one of the spaces:
Digital Bank's Web site evoked the following emotions in me:

Happiness	Not at all _ _ _ _ _ Very much
Playfulness	Not at all _ _ _ _ _ Very much
Cheerfulness	Not at all _ _ _ _ _ Very much
Enjoyment	Not at all _ _ _ _ _ Very much
Satisfaction	Not at all _ _ _ _ _ Very much
Surprise	Not at all _ _ _ _ _ Very much
Alertness	Not at all _ _ _ _ _ Very much
Attachment	Not at all _ _ _ _ _ Very much

10. What other emotions did the Web site evoke?

_____

_____

[1] Note that items 5 and 6 were only assessed in groups P-H and P-M

11. Please indicate your level of workload on each of the six factors below, for the sessions you have just completed.

Mental Demand (i.e., how much thinking, deciding, calculating, remembering, searching, etc. did you need to do?)

Not at all __ __ __ __ __ Very much

Physical Demand (i.e., how much physical activity was required?)

Not at all __ __ __ __ __ Very much

Time Pressure (i.e., do you feel you had enough time to adequately perform the experimental task?)

Not at all __ __ __ __ __ Very much

Performance (i.e., how satisfied were you with your performance in achieving the goals?)

Not at all __ __ __ __ __ Very much

Effort (i.e., how hard did you have to work, mentally and physically, to achieve your level of performance?)

Not at all __ __ __ __ __ Very much

Frustration Level (i.e., how insecure, discouraged, irritated, stressed and annoyed did you feel during the task?)

Not at all __ __ __ __ __ Very much

12. Digital Bank is trustworthy Strongly disagree __ __ __ __ __ Strongly agree

13. Digital Bank's image is close to my own image Strongly disagree __ __ __ __ __ Strongly agree

14. I would return to Digital Bank's Web site Strongly disagree __ __ __ __ __ Strongly agree

15. How well were you concentrating? Not at all __ __ __ __ __ Very much

16. Was it hard to concentrate? Not at all __ __ __ __ __ Very much

17. How self-conscious were you? Not at all __ __ __ __ __ Very much

18. Did you feel good about yourself? Not at all __ __ __ __ __ Very much

19. Were you in control of the situation? Not at all __ __ __ __ __ Very much

20. Were you living up to your own expectations? Not at all __ __ __ __ __ Very much

21. Were you succeeding at what you were doing? Not at all __ __ __ __ __ Very much

22. Indicate what you feel was the nature of the Web site on the following continuum:

Machine __ __ __ __ __ Human-being

23. I know who I was interacting with during the session Not at all __ __ __ __ __ Very much

24. The Web site was tailored to my personal needs Not at all __ __ __ __ __ Very much

25. Please mention two positive things about the Web site:

1._____

2._____

26. Please mention two negative things about the Web site:

1._____

2._____

27. Other comments on the Web site or experiment:

_____

_____

Thank you for participating! Please return the questionnaires to Jan Blom at the psychology department, B112H.

Appendix 2: Experiment 1 ANOVA tables

Two-way ANOVA on IT expertise

Between participants factors: personalisation and personification

Source	F (1, 75)	p
Personalisation	< 1	.912
Personification	1.471	.229
Personalisation * Personification	4.582	.626

Three-way split-plot ANOVA on session times

Within participants factor: Session

Between participants factors: Personalisation and Personification

Source	F (1, 67)	p
Personalisation	< 1	.597
Personification	< 1	.631
Personalisation * Personification	< 1	.982
Session	1.96	.166
Session * Personalisation	< 1	.970
Session * Personification	< 1	.924
Session * Personalisation * Personification	< 1	.896

Three-way split-plot ANOVA on estimated session times

Within participants factor: Session

Between participants factors: Personalisation and Personification

Source	F (1, 74)	p
Personalisation	< 1	.354
Personification	1.073	.304
Personalisation * Personification	< 1	.512
Session	21.209	.000
Session by Personalisation	3.792	.055
Session by Personification	< 1	.826
Session by Personalisation by Personification	< 1	.851

Three-way split-plot ANOVA on perceived over actual times

Within participants factor: Session

Between participants factors: Personalisation and Personification

Source	F (1, 67)	p
Personalisation	< 1	.586
Personification	< 1	.616
Personalisation * Personification	< 1	.728
Session	26.227	.000
Session * Personalisation	< 1	.346
Session * Personification	< 1	.963
Session * Personalisation * Personification	< 1	.672

Two-way ANOVA on emotion items

Between participants factors: personalisation and personification

Emotion item	Source	F (1, 76)	p
Happiness	Personalisation	< 1	.347
	Personification	< 1	.900
	Personalisation by Personification	< 1	.992
Playfulness	Personalisation	3.31	.073
	Personification	< 1	.382
	Personalisation by Personification	< 1	.688
Cheerfulness	Personalisation	< 1	.360
	Personification	1.511	.223
	Personalisation by Personification	1.668	.200
Enjoyment	Personalisation	< 1	.373
	Personification	< 1	.673
	Personalisation by Personification	< 1	.814
Satisfaction	Personalisation	< 1	.520
	Personification	< 1	.955
	Personalisation by Personification	1.425	.236
Surprise	Personalisation	< 1	.767
	Personification	< 1	.366
	Personalisation by Personification	< 1	.911
Alertness	Personalisation	< 1	.668
	Personification	< 1	.820
	Personalisation by Personification	< 1	.828
Attachment	Personalisation	2.404	.125
	Personification	< 1	.719
	Personalisation by Personification	< 1	.474

Two-way ANOVA on other items

Between participants factors: personalisation and personification

Item	Source	F (1, 76)	p
Trustworthiness	Personalisation	< 1	.713
	Personification	< 1	.713
	Personalisation by Personification	< 1	.916
Image congruence	Personalisation	< 1	.487
	Personification	< 1	.621
	Personalisation by Personification	3.043	.085
Return likelihood	Personalisation	2.463	.121
	Personification	< 1	.995
	Personalisation by Personification	< 1	.874
Human being	Personalisation	< 1	.560
	Personification	1.542	.218
	Personalisation by Personification	3.219	.077
Knowledge of audience	Personalisation	< 1	.652
	Personification	< 1	.390
	Personalisation by Personification	< 1	.992
Tailored to needs	Personalisation	8.970	.004
	Personification	< 1	.782
	Personalisation by Personification	< 1	.822

Web use study

University of York, 2000

To get started, please turn to page 2.

Web use study, general information

Thanks for volunteering to take part in this on-line study. This page contains general instructions. You should also read the instructions for each of the two sessions.

The experiment you are about to take part in consists of two sessions on the Internet. The first one is about filling in an application form to get an account at a fictional bank whereas in the second session you will be asked to use some banking functions, such as paying bills. We hope this experiment will answer certain theoretical questions and so may inform future designs for e-commerce. Even though you are really only pretending, please take the tasks seriously and behave if it really were your bank account you were accessing.

Use the following URL to access each session (you can also access this by clicking the url-link that is included in the email you've been sent):

http://www.york.ac.uk/res/ymcg/cfm/Digi2/instructions.cfm

You may use any computer that has an Internet connection. If possible, use Netscape as the browser. If you do the test at the psychology department, use the new iMacs in the MacLab. If these are not available, you will have to enable the images by clicking the image-button on the browser.

It is important that you don't do these sessions within the same day. Try to leave at least one day in between the sessions.

After each session, please fill in a short paper questionnaire (you will find these on pages 5 for session 1 and on pages 6 – 8 for session 2).

When you have finished the last session, bring the questionnaires back to Jan Blom (Psychology department, room B112H), and he will reward you with 4 pounds. If you have anything to ask regarding the experiment, you can contact Jan Blom (job103@york.ac.uk, ext. 3178) at any point. We'd also like to inform you that you are free to quit the experiment at any point.

Instructions for the first session

Type the following URL:
http://www.york.ac.uk/res/ymcg/cfm/Digi2/instructions.cfm

Click on the link for session 1

On the login-page for this session, you will be prompted for your ID number and the password (these will be the same for both sessions).

Your ID number:

Your password:

Once you are logged in, just follow the instructions.

The intention of the first session is that you fill in an on-line application for a bank account with DigiBank. You will also be prompted to submit some additional information.

In due time (approximately 10-15 minutes), you will be given the chance to exit the application.

Fill in the questionnaire on page 5 after this session. Try to do this immediately after logging out.

Instructions for the second session

Logon to this session from the same address as in session 1. Your id number and password will be the same.

Try to imagine the following scenario for session 2:

You have booked yourself a weekend trip to Paris in a few days time. Shortly before the trip, you will have to make a few preparations using the DigiBank's Web site. What follows is a list of the tasks you have to do (in any order):

- You need a travel insurance for the trip. You are limited on money so you need to buy one that is as cheap as possible.
- To get some extra cash for the trip, you'll also need to sell some of your shares. Choose one share type and sell them all.
- You know there are a few bills that need to be paid before leaving. Authorise the most urgent ones, i.e., those that are due this week.
- You notice that you do not know much about Paris. Thus, you will need to buy a travel guide on Paris. Luckily DigiBank's site offers you a chance to purchase books. In addition to buying a guide book, you also want something else to read while visiting the lovely cafes of Paris.

Feel free to use any links of the site to accomplish the tasks above. **It is important that you complete each of the tasks.** You don't have to quit the session after completing the tasks. You may stay logged on and familiarise yourself with the site.

When you want to finish the session, click the exit-link (located bottom left) and follow the instructions.

After the session, please fill in the second paper questionnaire.
Bring the completed questionnaires to Jan Blom at Psychology dept, B112H. You will then be rewarded with the four pounds.

1st questionnaire (to be filled in after the first session)

Please circle the responses (where 1=not at all; 5=very much) that correspond with the answer you wish to select.

	Not at all				Very much
1. How well were you concentrating?	1	2	3	4	5
2. Were you succeeding at what you were doing?	1	2	3	4	5
3. Were you aware of the flow of time?	1	2	3	4	5
4. Were you in control of the situation?	1	2	3	4	5
5. How self-conscious were you?	1	2	3	4	5
6. Were you living up to your own expectations?	1	2	3	4	5
7. Was it hard to concentrate?	1	2	3	4	5
8. Did you feel good about yourself?	1	2	3	4	5

Please indicate your level of workload (where 1=not at all; 5=very much) on each of the six factors below, for the sessions you have just completed:

	Not at all				Very much
9. Mental Demand (i.e., how much thinking, deciding, calculating, remembering, searching, etc. did you need to do?)	1	2	3	4	5
10. Performance (i.e., how satisfied were you with your performance in achieving the goals?)	1	2	3	4	5
11. Effort (i.e., how hard did you have to work, mentally and physically, to achieve your level of performance?)	1	2	3	4	5
12. Time Pressure (i.e., do you feel you had too little time to adequately perform the experimental task?)	1	2	3	4	5
13. Frustration Level (i.e., how insecure, discouraged, irritated, stressed and annoyed did you feel during the task?)	1	2	3	4	5

2nd questionnaire (to be filled in after the **second** session)

Personal details:

1. Name:_____ 2. ID number in the experiment:_____

3. Gender:_____ 4. Age: _____ 5. Course: _____

Please circle the answers that match your behaviour:

6. On average, how often do you use a computer?
less than once a week / once a week / a few times a week / every day

7. How many years have you used a computer?
less than one / between one and three / between three and five / more than five yrs

8. On average, how often do you surf the Internet?
less than once a week / once a week / a few times a week / every day

9. Where did you do the experiment (computer cluster, home, etc.)? _____

10. Did anyone help you during either of the sessions? Yes/No

2. The Web site:

Please circle the responses (where 1=not at all; 5=very much) that correspond with the answer you wish to select.

	Not at all				Very much
1. How well were you concentrating?	1	2	3	4	5
2. Were you succeeding at what you were doing?	1	2	3	4	5
3. Were you aware of the flow of time?	1	2	3	4	5
4. Were you in control of the situation?	1	2	3	4	5
5. How self-conscious were you?	1	2	3	4	5
6. Were you living up to your own expectations?	1	2	3	4	5
7. Was it hard to concentrate?	1	2	3	4	5
8. Did you feel good about yourself?	1	2	3	4	5

Please indicate your level of workload (where 1=not at all; 5=very much) on each of the six factors below, for the sessions you have just completed:

	Not at all				Very much
9. Mental Demand (i.e., how much thinking, deciding, calculating, remembering, searching, etc. did you need to do?)	1	2	3	4	5
10. Performance (i.e., how satisfied were you with your performance in achieving the goals?)	1	2	3	4	5
11. Effort (i.e., how hard did you have to work, mentally and physically, to achieve your level of performance?)	1	2	3	4	5
12. Time Pressure (i.e., do you feel you had too little time to adequately perform the experimental task?)	1	2	3	4	5
13. Frustration Level (i.e., how insecure, discouraged, irritated, stressed and annoyed did you feel during the task?)	1	2	3	4	5

For the following statements, please circle the response (where 1=strongly disagree; 5=strongly agree):

	Strongly agree				Strongly disagree
14. Using DigiBank's online banking is predictable	1	2	3	4	5
15. DigiBank's online banking is NOT dependable	1	2	3	4	5
16. DigiBank's online banking allows me to complete financial transactions accurately	1	2	3	4	5
17. I have faith in online banking through DigiBank	1	2	3	4	5
18. I trust DigiBank's online banking	1	2	3	4	5
19. Using DigiBank's online banking interface to complete my financial transactions is unreliable.	1	2	3	4	5

	Strongly agree				Strongly disagree
20. DigiBank enabled me to do tasks that I wouldn't normally associate with an on-line bank.	1	2	3	4	5
21. I found certain features of DigiBank irritating	1	2	3	4	5
22. The site was tailored to my personal needs	1	2	3	4	5
23. DigiBank's did not have character	1	2	3	4	5
24. I would return to DigiBank's site	1	2	3	4	5
25. I did not feel free to explore the site	1	2	3	4	5
26. Interacting with DigiBank was like interacting with a person	1	2	3	4	5

27. For each emotion dimension below, circle the number (1-5) that corresponds with your feelings regarding the use of the site.

	Very	Quite	Neither	Quite	Very	
accepting	1	2	3	4	5	suspicious
irritated	1	2	3	4	5	cheerful
interested	1	2	3	4	5	disinterested
disappointed	1	2	3	4	5	delighted
bewildered	1	2	3	4	5	self-controlled
dissatisfied	1	2	3	4	5	satisfied
adventurous	1	2	3	4	5	apathetic
intolerant	1	2	3	4	5	tolerant
affectionate	1	2	3	4	5	disaffectionate
serious	1	2	3	4	5	playful

28. Indicate what you feel was the nature of the Web site on the following continuum:

Machine 1 2 3 4 5 Human-being

3. Open-ended items:

1. What are your general feelings towards DigiBank's Web site?

_____

_____

2. Please write down what you thought was the best feature of the site:

_____

_____

3. Please write down what you thought was the worst feature of the site:

_____

_____

4. Other comments:

_____

_____

_____

Thank you for participating in the experiment.

Please return this questionnaire to Jan Blom at the psychology dept.

Appendix 4: Experiment 2 ANOVA tables

Two-way ANOVA on IT expertise

Between participants factors: personalisation and personification

Source	F (1, 90)	p
Personalisation	< 1	.586
Personification	< 1	.878
Personalisation * Personification	1.014	.367

Three-way split-plot ANOVA on session times

Within participants factor: Session

Between participants factors: Personalisation and Personification

Source	F (1, 87)	p
Personalisation	< 1	.663
Personification	1.244	.293
Personalisation * Personification	< 1	.948
Session	< 1	.449
Session * Personalisation	< 1	.798
Session * Personification	< 1	.830
Session * Personalisation * Personification	< 1	.740

Appendix 5: Two-stage study Session 1 protocol

1. Explain the aim of the session (to get you introduced with the 2 services)

2. Excite

- Explain the principle of Excite
- set up the account (easy to remember password, write it down on the instruction sheet)
- customisation of the style scheme
- customisation of the welcome phrase
- customisation of the picture

Ask whether familiar with anything like this from before

3. Moviecritic

- Explain the principle of collaborative based filtering ("uses statistical methods for identifying likeminded people from the database")
- Rate films
- Set up the account
- Look at some of the films on general release and video, prompt whether accurate in predictions

Ask whether familiar with anything like this from before

4. Hand out the instruction sheet for the 2nd session, go through it and make sure you've got the participant's email.

Appendix 6: Two-stage study between-session-tasks (email)

Hi all,

I promised to send you one or two things to do before the group meeting. This is just to get you more familiar with the sites so that it's easier for you to chat about your experiences with these sites.

These should not take more than a couple of minutes with each.

Excite

Click on the below link to enter Excite:
http://www.excite.com

You need to click the 'Sign in' link on top of the page to access your personalised Excite page.

Please try to accomplish the following tasks:
- Check for mail in your Excite email inbox
- Check out your horoscope for today
- Read the 3-day weather forecast for London

Moviecritic

To find this site, click on the following link:
http://www.moviecritic.com

Once again, you will need to enter your username and password, the username can be found on the sheet of paper that I gave you in the first session.

By using this site, please find out, which of the below films is most highly recommended to you by Moviecritic. These are all currently showing at the York Warner Village, so the information could be potentially useful to you.

Billy Elliot
Blair Witch 2
Coyote Ugly
Pitch Black

++++++++++++++++++

OK, that's all. See you soon.

Jan Blom

Appendix 7: Two-stage study Session 2 protocol

A. Initial stage

Ask for the permission to video-tape the session
The main focus of this meeting is to find out what you thought about these two sites
No right or wrong answers, so feel free to open your mouth at any point!
Also, it should be very informal, so just sit down and relax, and help yourselves to the sandwiches

- I know that at least we're all university students. Perhaps it's a good idea to start by introducing ourselves and maybe what course we're each doing

B. Introductory questions

- What do you use the web normally for?
- How do these examples, Excite and Moviecritic, compare to your experience?

C. Transition questions

- Tell me about the process of personalising Excite, how did it make you feel?
- What where you feelings toward Excite the first time you visited it after you had personalised it?
- Would you personalise it further?
- What about Moviecritic? What was it like to fill in the movie ratings?
- And how did it feel like to actually use the site for the first time to receive recommendations?
- Would you use this in the future? Why?

Provide an explanation of the definitions of personalisation (both user and system-initiated)

- Which kind of personalisation do you prefer? Why?

D. Key questions

- I've got pen and paper here for you. Please write down: What would you like to personalise? Why?
- Write down (a) What area would you like to receive recommendations on?; (b)Why you would wish to receive personalised recommendations?
- How does the fact that the site uses other people's recommendations make you feel?

E. Ending questions

- If you had a chance to influence the designer of a site, how would you advice them to use these personalisation features?
- I'm aiming to find out your perceptions on personalisation. Have I missed anything important?

Appendix 8: Finnish study discussion group protocol

Welcome

- I'm Jan Blom, from York University
- I'm, researching mobile phones
- Interested in your opinions, no right or wrong answers
- Let's start by introducing ourselves: tell me who you are and also tell me a funny story that you have about you and your mobiles

---

- How long have you had a mobile phone?
- How do you feel about your mobile?
- Put your mobiles on the table please. I'd like you to show me what you have done to change it since you got it (prompt further as to how often these take place)?
    - Tunes
    - Logos
    - Covers
    - Anything else?

- Where do you get your ideas to change the phones?
- When you talk about mobiles with your friends, what is the most common topic?
- Tell me about the last time when you changed something. Why did you do the change?

- How would you feel about your phones if you were not able to change them?
- On a piece of paper, could you please write down 4 adjectives to describe an unchanged phone (straight from the shelf of a shop) and your changed one
- Why do you do these changes?

Photograph phones and thanks

Appendix 9: Translation of the instructions given to Finnish study external judges

The kind of personalisation I'm interested in includes non-functional changes made to the mobile phones. The following illustrate this process:

- Ringing tones
- Logos
- Covers
- Decoration of covers

Your task:

1. Watch the videotaped session and make notes
2. Underline the comments on the transcriptions that refer to why an individual has personalised his phone
3. Use a pen of another colour to underline the comments that refer to the user effects of these changes
4. Copy the underlined extract to one of the tables below and provide a description of the comment.

[There were two tables, one for pasting comments referring to dispositions, another for pasting effects. The tables were not included in this appendix]

Appendix 10: Assessment of semantic match between categories created by the coder/analyst and those created by the judges

The table below includes the TPA categories created by the coder/analyst for which modal categories were identified from the judges' ratings. Cases in which the modal category was the non-coded one or where no modal category could be identified due to the equal distribution of the ratings were not included. A classification was created to determine the degree of semantic similarity between the pairs. The similarity had five levels.

First, the two words could be synonyms. Second, the pairs could be semantically reasonably close to each other. Such would be the case in the pair 'Reflection of Group Identity' versus 'Group Spirit', as produced by the coder/analyst and the judge, respectively. Third, the pair could refer to the same concept, but with the theory-based category having adopted a more specific expression of the particular issue. For instance 'Distinction' versus 'Extension of Self', where the former is a subcategory of Reflection of Personal Identity, would be an illustration of this. Fourth, a pair could be such that the words are somewhat close to each other in meaning. However one could not anyway claim them to refer to the same thing. An illustration of this was the pair 'Fun' versus 'Buddy'. These categories would be associated with the Socio-emotional Effects of personalisation, whilst not necessarily referring to exactly the same construct. Fifth, it could be the case that the words did not match each other at all.

Each judge analysed one group. The first column in the table refers to the group in question. Column two includes the category of the coder/analyst for which a modal category was identified from the judges' analyses. The next column includes the respective category used by the judge. To help the reader understand these categories, the respective super-categories of the categories produced by the judges were included in the table. The last column indicates the degree of semantic similarity that was judged by the coder/analyst to exist between each pair.

Group	Category used by the coder/analyst	Judge's category (super-category or categories)	Match*
1	Knowledge of P	Attachment (social/emotional)	5
	SEC	Group (group + social/emotional)	4
	Work-based Motivation	Practical (functionality)	2
	Spare Time	Passing time (functionality)	2
	Recognition of S	Practical (functionality)	3
	Symbol	Life (looks like self + long-term + self + social/emotional)	4
	Release from Boredom	Boredom (short-term + self + social/emotional)	2
	Fun	Passing time (functionality)	4
	Reflection of Personal Identity	Character (looks like self + long-term + self + social/emotional)	2
	Self-presentation	Character (looks like self + long-term + self + social/emotional)	3
	Reflection of Group Identity	Group (group)	2
	Improved Aesthetics	Aesthetics (functionality)	1
	Accommodating Current Em. State	Mood (looks like self + long-term + self + social/emotional)	1
	Seasonal and Media Influences	Society (group + social/emotional)	3
2	SEC	Practical reasons (rational reasons)	2
	System Feels Personal	Extension of self (self + emotion)	4
	Release from Boredom	Need for change (rational reasons + emotion)	2
	Fun	Pal (self + emotion)	4
	Reflection of Personal Identity	Extension of self (self + emotion)	2
	Distinction	Extension of self (self + emotion)	3
	Reflection of Group Identity	Group spirit (group + emotion)	2
	Attachment to S	Pal (self + emotion)	2
3	Knowledge of P	Constraint: technical (environment)	4
	Effectiveness of P Items	Physical: availability	2
	Recognition of S	Functionality (individual)	3
	System Feels Personal	Self: personal (individual)	4
	Release from Boredom	Boredom/annoyance (individual)	2
	Fun	Fun (individual)	1
	Fashion	Fashion (environment)	1
	Distinction	Self: distinguishing from the group (individual)	2
	Improved Aesthetics	Fashion (environment)	4
	Accommodating Current Em. State	Boredom/annoyance (individual)	4
	Cost of Personalisation	Physical: price (environment)	1

* 1 = synonym; 2 = good match; 3 = specific versus more general; 4 = some similarity; 5 = no similarity

Appendix 10 table. Semantic match between the TPA categories created by the coder/analyst and the respective modal categories of these, identified from the judges' ratings. P=Personalisation; S=System.

Appendix 11: Home Computer study computer usage questionnaire

Computer usage questionnaire

The answers you provide will be considered in anonymity.

1. Participant details

Please circle the suitable options:

Age: Under 18/18-24/25-34/35-44/45-54/55+

Sex: male/female

Occupation: _____

2. Computer usage

Please select the suitable option in each of the questions below:

How often do you engage in the following activities at home?

- Read and send email:

A few times a day/once a day/a few times a week/once a week/a few times a month/once a month or less

- Surf the net

A few times a day/once a day/a few times a week/once a week/a few times a month/once a month or less

- Word process

A few times a day/once a day/a few times a week/once a week/a few times a month/once a month or less

- Play computer games

A few times a day/once a day/a few times a week/once a week/a few times a month/once a month or less

- Other important (please specify):_____

A few times a day/once a day/a few times a week/once a week/a few times a month/once a month or less

I mainly use the Web to receive information relating to (circle one):

a) My hobbies
b) My work
c) Finance (banking, stocks etc.)
d) Entertainment
e) Other (please specify): _____

Have you ever bought something off the Internet?

Yes No

If so, what things have you bought?

_____

_____

Thank you for participating!

Appendix 12: Home Computer study interview protocol

A. Usage data

- First of all, tell me about your family, who else is living here?
- Which computer do you have?
- Why did you get a home computer?
- Was it you who bought it?
- Who uses it, besides of you?
- Do others use their own ones?
- How do you manage to share the computer?
- Can you tell me about the time when you last used your computer at home?
- Is that your main use of your PC?
- What other sorts of things do you normally use it for?
- What do you most enjoy doing with it?
- Would you say you're a work or leisure user?

So now we have an idea of how you generally use your computer (summarise) – I'd now like to find out about ways in which you may have changed your computer since you bought it. To do this, we should move to the computer.

As I mentioned in the lounge, we're going to talk about changes that you've made to your computer. It is easier to discuss these if you have your PC switched on

B. Personalisation

1. Desktop
(Background image, screensaver, icons, audio, font, desktop themes)

- Did you know that you can make changes to your desktop?
- Have you done anything to change your desktop?

If interviewee has not done anything, show the pictures.

- What do you think of these?
- How does it change your pc?
- Will you do this with your PC when we have gone?

- when was the last time this was done.
- How often do you change this aspect?
- How does it make you feel?
- Why do you do this?
- What if you could not do this?
- How does it change the way you view your PC?

2. Internet

- Have you done anything like that to a Web site?
- Have you done any of these:
    - Home page
    - Search portals
    - Internet chat rooms

Home page:
- Why did you choose this item?
- Are you happy with your page?
- Compare to desktop

Excite
- What are your initial thoughts?
- Does it change the way you look at this site?
- Compare to desktop

3. Mobile phone

Ask to see the mobile.

- What have you done to this?
- How often?
- Why?
- How does desktop personalisation compare to this?

Further prompts

C. General discussion (to take place either at the PC or back in the lounge)

- What do you think is the most essential thing about being able to personalise the appearance of

1. desktop
2. web site
3. phone

- Which do you prefer (desktop, mobile, net pages)?
- Why?
- What advice would you give someone who is designing features that would let you change/personalise technology?
- Summarise the views of the participant and ask if accurate.

D. Post-interview

Fill in the questionnaire
Ask if any questions
Thanks and money (with receipts)

Appendix 13: Descriptives on items omitted from the correlational analysis

Home page part of the questionnaire:

Item	Scale	Mean (SD)
1. How old is the site?	1=3+ years; 2=1-3 years; 3=6-12 months; 4=1-5 months; 5=<once a month	2.34 (.92)
3. How many of these visits are to update your site?	1=every one; 2=most; 3=half; 4=minority; 5=none	3.22 (1.12)
5. How many times, would you guess, has your site been visited by others?	1=0-50; 2=200-300; 3=300-500; 4=500-1000; 5=1000+	2.91 (2.29)
8. The Web site directed at	Myself 1 2 3 4 5 Others	3.54 (1.29)
14. I feel ownership over the site	Strongly agree 1 2 3 4 5 Srongly disagree	1.66 (.97)

Desktop part of the questionnaire:

Item	Scale	Mean (SD)
2. Operating system of the computer	1=N/A; 2=Windows 2000; 3=Windows 98; 4=Windows 95; 5=Other (what?)	Not meaningful to present mean for this item
7. I would personalise the desktop to a greater extent if the computer allowed me	Strongly agree 1 2 3 4 5 Srongly disagree	3.25 (1.27)
8. There should be more options to choose from when personalising the appearance of the desktop	Strongly agree 1 2 3 4 5 Srongly disagree	3.05 (1.07)
14. I feel ownership over the computer.	Strongly agree 1 2 3 4 5 Srongly disagree	2.40 (1.46)

Appendix 14: Experiment 3 protocol for Session 1

1. Prompt the participant to fill in the consent form

2. Explain the following:

   Thank you for taking part in this study. I have been acquiring persons with no prior experience in constructing web sites to participate in this experiment. During this session we will create a personal web user area which you can at a later stage use to publish your site on. The 2nd session consists of the actual web site construction during which I will be demonstrating a few simple steps, which will allow you to create a web site for yourself. I would like to emphasise that I am not interested in assessing how well you learn HTML or what the quality of the site that you produce is like. All I am interested in is what you think of your site. To assess this, you will be asked to fill in a short questionnaire at the end of the session

3. Scan the photos or photograph the participant. Save the files onto the floppy. Tell the PA subjects that the image won't be used to decorate their sites with but that they can do this at a later stage should they wish to do so. Tell the PP subjects that their images will be used to decorate their sites with.

4. (PP condition only) Open Corel Draw and ask the participant to create a title for the web site. Select size 72 but allow the user to select the font type and colour and create the title. Save the file on the floppy.

5. Create the personal web user area for the participant.

6. Provide the participant with the sheet containing the time and place of the second

Appendix 15: Experiment 3 home page construction instructions for Personalisation Present condition

Web site construction study: instruction package

November 2001

Jan Blom
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Department of Psychology
j.blom@psych.york.ac.uk

Purpose of the session

I'm interested in individuals' reactions to the web sites they create. You will be instructed how to construct one and at the end of the session, you will be asked to fill in a questionnaire, which assesses your views toward this site.

Please note that you are not being assessed on the quality of your work or on your learning abilities. All I'm interested in is your perception toward the site.

Finally, you will be provided with the opportunity to publish the site on the Internet. Though you are encouraged to do so, this is not a requirement. However, even if you do not wish to make the site live, please construct it in such a way that you could potentially publish it. I.e., don't just consider this as a learning exercise but as an opportunity to create a web site for you.

Overview

During this session you will

1) Open a file which includes some basic HTML elements
2) Using a HTML editor, complement this file to create a fully functioning web site
3) Save the file onto your personal web user area to publish it on the web (if you wish)

Step-by-step instructions on creating your initial web site

1. Start Internet Explorer

2. Start HTMLed Pro

HTMLed Pro is available from the Windows Start Menu. The selections are:

Programs|Web tools|HTMLed Pro 3.0

3. Open HTM file containing the blank web site

Insert the floppy into the A-drive. On HTMLed Pro, open 'index.htm' from the A-drive.

4. View blank page in Netscape

5. Insert a title and view the effect on Internet Explorer

```
<HTML>
  <HEAD>
    <TITLE>Insert Document
Title</TITLE>
  </HEAD>
```

The passage you choose to write between the title-tags will be displayed on the top left corner of the browser when a user visits your site.

6. Insert the title image created in the intro session

You will now be asked to insert the image that you created using Corel Draw during the initial session. Place the cursor underneath the <font> tag.

Select the insert image option from the top toolbar:

Type the name 'title.gif' to the Image box and then click 'OK'. View the result.

7. Insert a horizontal rule underneath the title

```
<img src="title.gif">
```

8. Select the background colour for the site

Insert a 'bgcolor' attribute into the body tag. This will then change the background colour of the window to the colour of your choice. Each colour has a code, select the suitable one from the following web site: http://html-color-codes.com/

```
<body bgcolor="colourcode of your
```

Take into account the colour you have chosen for your title.

9. Select the font type

Place the cursor underneath the <body> tag and select the following option from the toolbar on the top:

Choose the font type that you wish to use on the site and click 'OK'.

Move the **** tag to the end of the document, above the **</body>** tag:

```
</font>
</body>
```

10. Enter your photograph and a 'who am I' section in Table 1.

The code for a table including one row and two columns has been included in the HTML document. You can enter the image of yourself in the first column and include a few sentences of yourself to the second column:

```
<TABLE width="350" BORDER="0" CELLPADDING="0"
CELLSPACING="0">
    <TR>
        <TD>Enter photo of self ('myphoto.gif')</TD>
        <TD align="center"><font face="Enter font type">Enter intro of
yourself</font></TD>
    </TR>
</TABLE>
```

When entering the introduction of yourself, you may use text formatting tags, such as <p> and <br> to edit the appearance of the text passage.

You will unfortunately need to re-define the font type.

11. Insert 'likes and dislikes' or 'hobbies and interests' in table 2

Table 2 will include one row and two columns. Please enter three things that you like (or your hobbies) in the first column, as an unordered list, and three aspects that you dislike (or your activities) in the second column:

Helpful hints

```
<TABLE width="550" BORDER="1">
  <TR>
    <TD width="50%">Likes/hobbies:
      <UL>
       <LI>Enter first item
       <LI>Enter second item
       <LI>Enter third item
      </UL>
    </TD>
    <TD>Dislikes/activities:
      <ul>
       <li>Enter first item
       <li>Enter second item
       <li>Enter third item
      </ul>
    </TD>
  </TR>
</TABLE>
```

3.7 Table 3: Your other photograph

12. Insert the other photograph in Table 3

In the third table you will get the chance to enter the other photograph that is saved on your disk as 'otherphoto.gif' (column 1) and to provide a verbal explanation of the photo in column 2:

```
<TABLE width="550" BORDER="1" CELLPADDING="0"
CELLSPACING="3">
   <TR>
      <TD> Enter image 'otherphoto.gif' here
      </TD>
      <TD align="center"><font face="Enter font type">Enter intro of
photo</font>
      </TD>
   </TR>
</TABLE>
```

13. Insert your contact details

Finally, you are asked to include your contact details to the end of the page (above </body> tags).

Please use the <address> tag to accomplish this:

My contact details:
<address>
Enter your details
</address>

You are not advised to enter your home or term time address.

Publishing the site

Finally, we hope you will want to publish the site on the WWW.

As a student of the University of York, you are automatically provided with the opportunity to present web-based material on your *personal web user area*.

All you need to do is create a folder called 'web' to your M-drive. You can then move the files that are currently on the disk onto this folder. This can be achieved easiest with Windows Explorer. From the Start menu, use the following route to access this:

Programs|Accessories|Windows Explorer

The following allows you to create the folder 'web':

File|New|Folder

Once you have managed to create the new folder, copy the 'index.htm' file from the disk onto the 'web' folder on your M-drive. The browser will know that this is the main page of your site (because it's called 'index') and will thus automatically open this page when the URL of your site is retrieved.

The URL of your site is **http://www-users.york.ac.uk/~your username**

Appendix 16: Experiment 3 home page construction instructions for Personalisation Absent condition

Web site construction study: instruction package

November 2001

Jan Blom
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Department of Psychology
j.blom@psych.york.ac.uk

Purpose of the session

I'm interested in individuals' reactions to the web sites they create. You will be instructed how to construct one and at the end of the session, you will be asked to fill in a questionnaire, which assesses your views toward this site.

Please note that you are not being assessed on the quality of your work or on your learning abilities. All I'm interested in is your perception toward the site.

Finally, you will be provided with the opportunity to publish the site on the Internet. Though you are encouraged to do so, this is not a requirement however. Even if you do not wish to make the site live, please construct it in such a way that you could potentially publish it. I.e., don't just consider this as a learning exercise but as an opportunity to create a web site for you.

Overview

During this session you will

Open a file which includes some basic HTML elements
Using a HTML editor, complement this file to create a fully functioning web site
Save the file onto your personal web user area to publish it on the web (if you wish)

Step-by-step instructions on creating your initial web site

1. Start Internet Explorer

2. Start HTMLed Pro

HTMLed Pro is available from the Windows Start Menu. The selections are:

Programs|Web tools|HTMLed Pro 3.0

3. Open HTM file containing the blank web site

Insert the floppy into the A-drive. On HTMLed Pro, open 'index.htm' from the A-drive.

4. View blank page in Netscape

5. Insert a title and view the effect on Internet Explorer

```
<HTML>
  <HEAD>
    <TITLE>Insert Document
Title</TITLE>
  </HEAD>
```

The passage you choose to write between the title-tags will be displayed on the top left corner of the browser when a user visits your site.

6. Insert heading for the web site

Place the cursor underneath the <body> tag and insert a suitable heading for the web site.

7. Change case of the heading

Highlight the title/heading and on HTMLed Pro toolbar, press the following to retrieve the case editing wizard:

8. Insert a horizontal rule underneath the heading

```
<h1>your heading
</h1>
```

9. Insert 'who am I section'

Place the cursor inside the <pre> tag and write a short introduction of yourself.

10. Insert likes and dislikes or hobbies and interests in table 1

Table 1 will include one row and two columns. Please enter three things that you like (or your hobbies) in the first column, as an unordered list, and three aspects that you dislike (or your activities) in the second column:

```
<TABLE width="550" BORDER="1">
  <TR>
    <TD width="50%">Likes/hobbies:
      <UL>
      <LI>Enter first item
      <LI>Enter second item
      <LI>Enter third item
      </UL>
    </TD>
    <TD>Dislikes/activities:
      <ul>
      <li>Enter first item
      <li>Enter second item
      <li>Enter third item
      </ul>
    </TD>
  </TR>
</TABLE>
```

11. Insert links in table 2

Table 2 includes an unordered list of three links in its second column. Please insert links to University of York, a search engine and a news service (e.g. BBC, CNN, or any national newspaper) on these list items.

```
<TABLE width="550" BORDER="1" CELLPADDING="0"
CELLSPACING="3">
  <TR>
    <TD width="20%" valign="top">Some useful links:</TD>
    <TD>
      <OL>
        <li>Insert link of University of York </li>
        <li>Insert link of a search engine</li>
        <li>Insert link of a news service</li>
      </OL>
    </TD>
  </TR>
</TABLE>
```

To accomplish this, first think of a sentence that would contain the link, e.g. "Click here to access University of York home page"

Then write this sentence and highlight the word that you think should contain the link. Click on the below to open the link wizard.

Enter the URL in the appropriate box and click OK.

Repeat this for each of the three links.

12. Insert your contact details

Finally, you are asked to include your contact details to the end of the page (above </body> tags).

Please use the <address> tag to accomplish this:

My contact details:
<address>
Enter your details
</address>

You are not advised to enter your home or term time address.

Publishing the site

Finally, we hope you will want to publish the site on the *WWW.*

As a student of the University of York, you are automatically provided with the opportunity to present web-based material on your *personal web user area.*

All you need to do is create a folder called 'web' to your *M-drive. You can then move the* files that are currently on the disk onto this folder. This can be achieved easiest with Windows Explorer. From the Start menu, use the following route to access this:

Programs|Accessories|Windows Explorer

The following allows you to create the folder 'web':

File|New|Folder

Once you have managed to create the new folder, copy the 'index.htm' file from the disk onto the 'web' folder on your M-drive. The browser will know that this is the main page of your site (because it's called 'index') and will thus automatically open this page when the URL of your site is retrieved.

The URL of your site is **http://www-users.york.ac.uk/~your username**

Glossary of terms

eCommerce	Electronic commerce
GT	Grounded theory
GTA	Grounded theory analysis
HCI	Human Computer Interaction
IPAM	Incremental Probabilistic Action Modeling
MUD	Multi User Dungeon
RS	Recommender system
SEC	Socio-emotional Context of Use
SMS	Short Message Service (mobile phone text message)
TPA	Theory of Personalisation of Appearance

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