

A strategy for creating design methods based on social behaviours for pleasurable user experiences in human-computer interaction

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Abstract

This paper reports research into the identification of a strategy for developing situation specific design methods to produce interface design guidelines that include the social and emotional nature of users to create pleasurable user experiences in human-computer interaction (HCI) in retail e-commerce.

The paper conceptualises a new way to use information about user experiences in specific real world social interactions to synthesise interface design guidelines based on specific identified social behaviours (i.e. situation-specific design methods or guidelines).

This focus on the development of a strategy to build design methods, rather than the design methods themselves, situates this research on a different conceptual level compared to research directed at design methods themselves.

Conference theme: Methodological issues

Keywords: user interface, human-computer interaction, design method, emotions, social behaviours

Introduction

Many recent researchers (see for example, Brave, Nass, Hutchison, 2005, Fogg 2003, Nass & Lee 2000, Norman 2004, Reeves & Nass, 1996) consider embracing the user's social and emotional nature one of the key factors to balance and broaden the development of HCI. In recent years, the field of human-computer interaction (HCI) has witnessed increasing interest in user interface design looking for a holistic perspective that includes emotions such as fun, joy, pleasure, and aesthetic value. The research presented in this paper contributes to an aspect of this social-emotional approach to design that attempts to improve the quality of users' experience with computers. Like others in this design and emotion field, the research shares an interest in the question: "How can we design socially and emotionally engaging user interfaces?"

There is a major difference between the approach presented here and the mainstream direction of the literature of social-emotional HCI in how the raw data of social behaviours and emotions is applied to the design of user interfaces. The research described in this paper is aimed at development of systematic strategies for guiding designers to create social-emotional interfaces for specific situations based on social behaviours identified from real world social interactions. The strategy provides a framework for developing a design method and design research specific to each individual design project. That is, the paper describes a HCI meta-method for developing design methods.

The research was founded on and extends established bodies of theory in this area including: the media equation theory of Reeves & Nass (1996)—more widely known as the CASA (Computers Are Social Actors) paradigm—Computers As Persuasive Technologies (or captology) of Fogg (2003), and the 'circles of relationships theory' of Shneiderman (2002)

For the last decade, the CASA paradigm has been an inspiration and guide for social-emotional HCI studies by demonstrating that human-computer interaction is very similar to social interaction (Reeves & Nass, 1996). Findings from over 50 studies conducted by Reeves and Nass showed that humans followed social behaviours and displayed emotions when interacting with computers similar to what happens in social interactions with people. The importance of CASA paradigm has been well recognised by Norman (2004), the foremost leader of usable user interface design. In his recent discussion of emotional design, Norman emphasised that computer technologies evolve around human needs and in accordance with social interactions.

From a design practitioner's perspective, however, the CASA paradigm has not actively expanded its scope into design guidelines for practical design applications. To date, the CASA paradigm has focused primarily on a validation of computer users' social responses towards computers. As a design-specific tool, CASA lacks the following qualities:

- Identifying appropriate social behaviours for a specific context of human-computer interaction.
- Identifying strategies for adapting social behaviours found in specific situations for the detail of design of user interfaces.

This is a subtle point. The CASA paradigm has identified that people behave socially and respond emotionally towards computers; therefore, in theory, social behaviours can be used as sources for user interface design to design human-computer interaction that is natural to human users (Reeves & Nass, 1996). However, the focus has been to trial findings of social science in human-computer interaction.

From a design perspective, CASA does not provide the basis for choosing specific design details on an interface on the basis of knowledge about specific social behaviours, nor does it provide a means of identifying optimal design details for design of an interface for a specific situation (say) a website for selling hairdressing services. It is in this territory not addressed by CASA that this paper contributes.

Captology by Fogg (2003) is an extension of the CASA paradigm. Its focus is the persuasion found in social interactions (e.g. flattery and reciprocity) to develop computers that can potentially persuade and motivate users to achieve their goals and needs effectively. For example, in the design of user interfaces for websites, Fogg used his captology perspective to explore two specific social attributes, trustworthiness and expertise, and how they convey credibility. Trustworthiness is a component of credibility, yet trustworthiness alone may not effectively address other closely related issues such as the problems of skepticism about the reliability of information presented on the site.

Captology tries to address the above weaknesses of the CASA paradigm by attempting to reverse engineer potential design knowledge. For example, characteristics of user interfaces related to credibility were predefined by the researchers and participants were asked to rate the characteristics of user interfaces of e-commerce websites using a 7-point Likert-type scale survey questionnaire based on these characteristics. See Table 1, page 7, for a comparison of methods used in CASA studies, Captology (credibility study), and approach of this research.

This approach provides some useful design information but inefficiently. The approach requires creating enough design solutions in the hope that some are successful and then the characteristics of those that are successful can (hopefully) be inferred from reverse application of captology theory. A central problem is that it is unclear that any such findings will successfully transfer to other design projects.

Shneiderman (2002) claimed in his 'Circles of Relationships' theory that drivers of positive human-human relationships can be reflected in the design of a user interface to create the same or similar positive relationships between users and computers. This has substantial overlap with CASA yet offers the start of a way out of the problems that CASA does not provide the basis for guiding successful design decisions. Identifying the social attributes or drivers that create, maintain and enhance positive interpersonal relationships could act as a key to identify detailed interface features that would result in positive human-computer relationships. A problem is that many of these social behavioural precursors of positive human computer relationships are situation specific rather than general. One way to identify these appropriate social behaviours and emotions is by examining real world situations and to ask participants about the things that in (say) a retail situation make the relationship between consumers and sales assistants positive and pleasurable.

Approach of this research

Based on the CASA paradigm, the research outlined in this paper hypothesised that social behaviours displayed in real social interactions can be used in a formal design process in the design of user interfaces (echoing those specific social situations) to enhance the quality of the human-computer interaction.

This is in effect, developing a strategic framework for developing design methods and guidelines that inform the fabrication of interface designs for specific situations. Creating such a strategy required addressing two tasks: (1) identifying and selecting relevant social behaviours that are associated with pleasurable and unpleasurable emotions in a specific situation; and (2) identifying an approach for transforming the identified social behaviours into guidelines for user interface design.

Social behaviours and emotions associated with social behaviours are context specific and exhibited through interactions with others (Gahagan, 1984). A match between a set of social behaviours and a context of interaction, to which the set of social behaviours can be applied, is

an important issue. A mismatch between a set of social behaviours and a context of interaction may cause imbalance and chaos in the interaction, and cause negative emotions in people involved in the interaction. For example, social behaviours displayed in the interaction between a customer and salesperson may differ from those appropriate to interactions between a teacher and student.

This research focused on retail e-commerce guided by the following three themes:

1. Identifying social behaviours appropriate for the design of user interfaces for a retail e-commerce website;
2. Identifying ways of adapting codified data about observed social behaviours into the design of user interfaces; and
3. Developing practical applications of the use of these tools for designing interfaces that will elicit appropriate social behaviours and emotions into the design of user interfaces for a chosen e-commerce website.

The ‘circles of relationships’ concept of Shneiderman (2002) was employed to select appropriate social behaviours for the chosen HCI context of e-commerce—i.e. a relationship between consumers and salespeople pleasurable. Unpleasurable experiences were also investigated in order to identify design elements to be avoided when designing user interfaces.

The data from in-depth interviews of consumers was thematically analysed using the qualitative data analysis software to derive meanings of participants’ lived shopping experiences and to gain insightful descriptions of the social behaviours followed by sales assistants from the participants’ perspective. The model of design guideline development of Alexander, Ishikawa, and Silverstein (1977) in ‘The Pattern Language’ was used to provide the design process bridge between the identified real world social experiences and the development of design guidelines. Based on the Pattern Language (Alexander, Ishikawa, & Silverstein, 1977), this research hypothesised that:

One way to adapt identified social behaviours into social-emotional interface design guidelines is to establish morphological connections between social behaviours and user interface design based on their functions.

The pleasurable and unpleasurable social experiences identified from the interviews were used to identify ‘classic’ problem states and morphological connections to patterns of design solutions. This is, in essence, a **strategy** for creating design guidelines. It was named the E-

commerce Social Interface (ECOMSI) strategy. Figure 1 below provides a process model of the ECOMSI strategy.

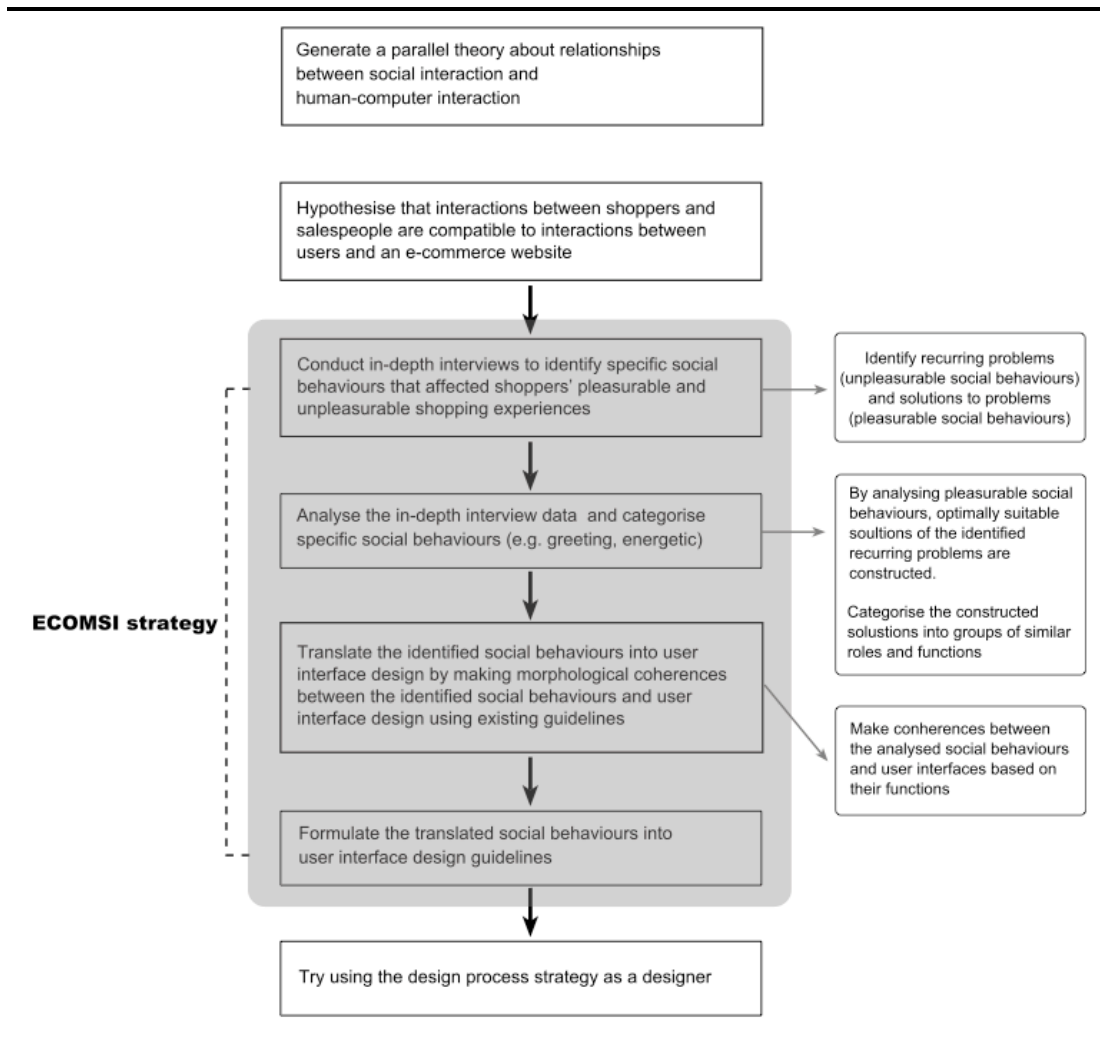


Figure 1: approach of this research and the ECOMSI strategy within (highlighted in grey box).

	The CASA method	Fogg's method	ECOMSI strategy
Purpose	To trial people's social responses towards computers.	To identify (or rate) the characteristics of user interfaces that increase and decrease users' perception of credibility of a website.	To develop a systematic strategy to identify and adapt social behaviours about specific situations into user interface design guidelines.
Social behaviours	Randomly selected. Social behaviour itself is not the important research issue, as the main focus of the investigation is to test whether people respond socially towards computers that display the selected social behaviour.	Social behaviours to be studied were predefined by the researcher. The social behaviours of trustworthiness and expertise are perceived as crucial social elements that can be used to eliminate users' sceptical of the information delivered on websites and increase the acceptance of websites.	Social behaviours to be studied were not predefined. Social behaviours are considered unknown factors that need to be identified.
Participants	Randomly selected recruiting a wide range of people with difference age groups, cultural backgrounds, education levels, and computer experience. Participants played a role in validating the hypothesis—people respond socially towards computers.	Randomly selected. To allow a cross-cultural analysis of the data, participants were selected from two countries: Finland and United States. All participants had extensive experience of using the Web and purchasing online. Participants acted as a filtering mechanism determining which characteristics of interface design would increase or decrease credibility of a website.	Participants were selected based on their likelihood of being the users of a particular type of e-commerce website. Participants provided social behaviours that needed to be studied and that could inform the development of interface design guidelines.
Outcomes	Validation of people's social responses towards computers.	Provide design implications (or guidelines) based on the measured ratings of the characteristics of user interfaces.	Provide a strategy for producing interface design guidelines. Provide a set of interface design guidelines that are analytic and interpretive (see chapter 6).

Table 1: Comparison of methods.

ECOMSI Strategy

The ECOMSI strategy has four practical phases:

- Data collection
- Analysis
- Interpretation (morphological relations)
- Distillation of interface design guidelines

These are described in detail in the following sections.

Phase 1: data collection

The first phase involved in-depth interviews to obtain data that were personally experienced phenomenon of a specific lived type of event or situation (Thompson, Locander, & Pollio, 1989). A specific group of participants were selected in order to create a match between the user and the user interface for the chosen context of human-computer interaction (i.e. online shopping via an e-commerce website for toys). In the case of the research, which focused on the retail situation of an eToys website, eligible participants for the interviews were parents with children aged between zero and five and twenty-six participated in in-depth interviews.

Phase 2: data analysis

Four layers of data analysis were used as shown in Table 2 to analyse the data from the in-depth interviews.

Analysis 1: data categorisation	<ul style="list-style-type: none">• Coding tentative categories from the emerging themes in the data
Analysis 2: data refinement	<ul style="list-style-type: none">• Creating systematic coded categories and deeper data interpretation
Analysis 3: data clarification	<ul style="list-style-type: none">• Shifting the focus of the analysis from the categories to the attributes• Refining the list of attributes
Analysis 4: data interpretation	<ul style="list-style-type: none">• Grouping the attributes with similar attributes• Comparing the grouped attributes with existing guidelines

Table 2: Outline of the four modes of analysis

In the data **categorisation**, recorded interviews were transcribed. The transcripts were analysed to gather initial categories of behaviours followed by salespeople (e.g. humorous). In data **refinement**, the transcripts were read again to refine the categories that emerged in the first mode of data analysis and identify terms of the categories describing behaviours that were expressed commonly among the participants. This process involved reading individual interviews and constantly comparing subsequent with previous interviews. The colour code technique of Nvivo proved useful for this.. In this data refinement process, attributes describing categories of behaviours also emerged (see Table 3 for an example).

Categories	Attributes
Funny / Humorous	<p><i>He was quite funny. He was funny... happy and very happy on the phone so we interacted quite well. There was a couple of jokes even thrown in there, which made us both laugh...</i></p> <p><i>...because he was trying to I had two to pay anyway and he was trying to do it together but it wouldn't let him. So I said "No~ that's fine do it separately". Separate receipt numbers anyway. "Oh~ great not a problem" you know and then we made jokes about computer system stuff. Even because he couldn't do it separately so it took longer him doing it separately but I didn't mind because he was friendly about it.</i></p> <p><i>Another thing about making a pleasant [shopping experience] is often I appreciate a level of humour. I do appreciate humour because humour, I think, humour dissolves or disarms certain elements of the situation.</i></p>
Lack of humour	<p><i>Negative aspects, [...] start with humour to be utterly humourless. Every now and again I will make a joke and the sales staff look at me like I just farted or something and you go "I am sorry I was just trying to make this [...] I just wanted to make this light-hearted. You don't have to be so serious about it". [...] So when they are humourless about it. Some</i></p>

	<i>people take what they do way too seriously.</i>
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Table 3: An example of categories and attributes describing the categories.

In **data clarification**, the focus shifted from categories to attributes, which were refined and analysed to provide:

- contexts of their usage;
- background information;
- problem situation; and
- instructions of how they can be executed.

Phase 3: data interpretation

The **data interpretation** was the last step of the four data analyses and formed part of third phase of the ECOMI strategy (see Figure 1 and Table 2). Its focus was to identify similarities that led to the emergence of meta-categories of related attributes of behaviours.

These first three steps of thematic data analysis provided (see Table 4):

- twenty-six categories of social behaviours (only coincidentally matching the number of interview participants);
- attributes, derived from interview conversations, describing the twenty-six categories; and
- four meta-categories that grouped the twenty-six categories of social behaviours in ways guided by the attributes.

Descriptions of social behaviours provided by participants were detailed and explicit. The descriptions provided accounts that could lead to solutions for problems identified in accounts of unpleasurable shopping experiences. In data analyses, each pleasurable social behaviour identified in the interviews was given a descriptive name or phrase based on the descriptions provided by participants.

Communication (14)	1	Greeting customers
	2	Familiarity
	3	Considering customer's shopping companions
	4	Conversation with customers

	5	Conversational product information
	6	Proactive service
	7	Equal service
	8	Tone of communication
	9	Professional mannerism
	10	Information confirmation
	11	Empathic response
	12	Genuine and honest service
	13	Sales tactics
	14	Ending transaction
Usability (8)	15	Speak the customer's language
	16	Promptness and alertness
	17	Detailed product information
	18	Providing product suggestion
	19	Provide information meaningfully
	20	Product demonstration
	21	Direct the customer to helpful people
	22	Important shopping information
Visual design (1)	23	Personality of e-commerce websites
Problems recovery (3)	24	Listening to customers
	25	Apologetic customer service
	26	Acknowledging waiting customers

Table 4: twenty-six ECOMSI-derived user interface design guidelines and four meta-categories.

Phase 4: formation of user interface design guidelines

The newly emerged four meta-categories of behaviours were morphologically mapped to conventional well established design guidelines from the domains of communication studies, usability engineering, and visual design (these domains being most relevant to the example at hand of designing an eToys e-commerce website). This morphological linking, following the practices of 'The Pattern Language', provided a straightforward way to translate the identified behaviours into the language of user interface design.

The correlations between social behaviours and user interfaces provided a way to join two completely different subjects. The Pattern Language by Alexander, et al. (1977) had demonstrated that human environments and situations could be interpreted into a language of patterns and design guidelines. Their interpretation process was done by: (1) analysing recurring problems in human environments, situations, interactions, and behaviours; and (2) providing solutions in the form of instructions to designers. This process of seeking solutions for problems is parallel to the process developed in the research described in this paper. Social interactions between customers and salespersons were observed via interviews to gain an insight into patterns of social behaviours embedded in a particular type of social interaction. The social behaviours that emerged in the earlier data analyses were segregated in terms of whether they were pleasurable and unpleasurable. Pleasurable social behaviours provided the basis for solutions and, through morphological mapping onto established design guidelines, design patterns for the design of interfaces to create positive and pleasurable interactions between humans and computers

Analysis of the interview data indicated that identified unpleasurable social behaviours were typically the exact opposites of pleasurable social behaviours. An obvious explanation of the opposite, yet comparable, correlations between pleasurable and unpleasurable social behaviours is that unpleasurable shopping experiences are a consequence of the absence of the social behaviours that affected pleasurable shopping experiences. For example, a friendly greeting by a salesperson elicited pleasurable emotions in participants, and contributed to making a shopping experience pleasurable. Conversely, no greeting or an unfriendly greeting by a salesperson frustrated and upset participants, and made them feel unappreciated.

Outcomes

The research presented in this paper has led to a new systematic strategy (ECOMSI strategy) for creating design guidelines for the design of pleasurable HCI interfaces for computer systems that echo real world situations. The key contributions to knowledge of this research are:

- The identification of limitations in terms of guiding design practice of the other main social emotional approaches to HCI
- The focus on developing a *strategy* for creating design guidelines that are specific to particular situations
- The basis in data gathering from individuals about their experiences in real world social situations similar to those echoed in the computer interface being designed.

- The morphological mapping of this situation-specific information about social behaviours and emotions to already well established design guidelines from design domains relevant to the design project at hand.
- The integration of all of the above into a systematic strategy for creating design methods specific to individual social-emotional HCI design projects.
- The initiation of a new level of theory-making relating to HCI design methods at a strategy level rather than at the level of the methods themselves

In practical terms, the approach described above was trialled by the first author, wearing her hat as a professional designer, in a redesign of an eToys website. The approach proved straightforward to use. In practice, the ECOMSI strategy results in information to the designer about which conventional design guidelines and interface features are most relevant in social-emotional terms to the specific interface design they are tackling, and why. With the addition of this information about prioritising design guidelines and features, the HCI design process proceeds as normal.

Summary and conclusions

The paper has described research that led to a new ‘strategy-based’ approach to developing situation-specific design methods in social–emotional HCI design (the ECOMSI strategy).

The research demonstrated it is possible to identify social behaviours that are applicable to user interface design of human-computer interaction and to use a morphologically-based systematic approach to create a design method that advises designers on design guidelines and design features that lead to the intended social-emotional experiences for users.

This strategy-based approach for developing design methods for HCI can be developed more extensively and its applicability and practicality trialled across other design practices of HCI.

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