

The Design of Web Sites Adaptable to Emotion-related Aspects

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ABSTRACT

In this paper, we discuss an approach to designing Web sites, which can be adapted to emotion-related aspects. We present a set of design criteria that have been identified for this purpose and show how they have been applied to a specific case study: an adaptable Web site for e-readings. The Web site has been designed for supporting four versions of users interfaces, which correspond to different emotions in order to better support user experience. We also report on the user tests that have been carried out for this work.

Keywords: *User Experience Guidelines, Web Sites, User Interface Adaptation*

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1. Introduction

The conception of usability has been evolving, along with the emerging IT landscape and the ever-blurring boundary of the field of Human-Computer Interaction (HCI). User experience (UX) is broadly defined as including attainment of behavioural goals, satisfaction of non-instrumental (or hedonic) needs, and acquisition of positive feeling and well-being. There is limited understanding of how to design for and evaluate UX. Traditional usability is characterized as task-oriented and performance-based. The three canonical usability metrics – effectiveness, efficiency and satisfaction – address the instrumental and non-instrumental aspects of technology use. Satisfaction is a composite term, amalgamating a cluster of “felt experience” (McCarthy & Wright, 2004), and is measured in a coarse-grained manner. Current UX research efforts attempt to reduce the composite satisfaction into elemental attributes – e.g. fun, pride,

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pleasure, surprise, intimacy, joy – and understand, define and quantify such attributes. User experience is associated with a change of perceptions, emotions, and behaviour deriving from the use of a system. The user is considered not only as a task executor but also as a set of emotions and feelings. The goal is to extend the satisfaction attribute of usability in order to achieve not only practical but also emotional satisfaction. User experience is something that evolves over a time span (Karapanos, Zimmerman, Forlizzi & Martens, 2009), which is not well-defined. Its effectiveness should be guaranteed over time while using the application. Various groups of aspects should be considered: aesthetic and attractiveness (Hartmann, Sutcliffe & De Angeli, 2002), pragmatic aspects, and hedonic aspects (Hassenzahl, 2003). They have different importance over the various phases through which the experience evolves. In the initial phase when the user expectations are created, it is important to stimulate interest and curiosity towards the use of the application. This can be obtained through aesthetic and appealing graphics, which should be able to promote a first visual appeal (Mullet & Sano, 1995). This should then be followed by a set of elements that help users to easily understand how to accomplish the associated tasks (the pragmatic qualities). In the actual use of the application over time the hedonic qualities play an important role because they promote user identification with the application, allow users to personalise it, stimulate its use through the continuous updating of content and the possibility to increase the knowledge and the ability of users. In our study we have focused on Web applications, and recent studies (Tuch,argas-Avilla, Opwis & Wilhelm, 2009) have also indicated that visual complexity of Web applications has multiple effects on human cognition and emotion, including experiences pleasure and arousal, facial expression, task performance, and memory.

In general, various aspects related to user experience need further research but a body of knowledge regarding this concept has matured in recent years and one issue is how to make it exploitable by developers of interactive applications. Indeed, such developers often have no time or the background to look at the scientific literature in this field and would appreciate the availability of a set of guidelines to help them to orient their work in order to improve the user experience of their applications. After an analysis of various studies in the user experience area it is possible to identify a number of aspects that can form the core of a set of user experience guidelines, oriented to Web applications.

In this paper we present some results aiming to contribute to the solution of this problem by providing a set of indications that can be useful for obtaining user

experience guidelines for interactive application developers. In particular, we first introduce the main aspects characterising the design of a Web site adaptable to emotions, which can be a useful starting point for a set of user experience guidelines. We then show an example application consisting in a Web site for e-documents access able to adapt depending on various types of emotions, and report on some user tests. Lastly, we draw some conclusions and provide indications for future work.

2. The design of a web site adaptable to emotions

In order to start reasoning more concretely about user experience guidelines, we have decided to develop a Web site implementing some of them. Since the scope of user experience is very broad we decided to focus on how to relate the guidelines to various possible emotions. For this purpose the Web site allows the users to choose among a set of predefined emotions, and the choice triggers changes in the Web site presentation and content to match the selected emotion.

For our work we wanted to select a small set of emotions with clearly different characteristics. We considered some studies aiming to classify emotions and a recent study (Petrie & Harrison, 2009) that identified the most common words and adjectives describing the emotions stimulated or expressed by a Web site. In the end, we selected four possible emotions (anger, calm, joy, sadness) that represent well four cases identified by two orthogonal dimensions: one dedicated to negative versus positive feelings, and one identifying static versus dynamic emotions. Indeed, in the choice of the emotions to address we considered that calm as well as sad feelings are part of the set of emotions that previous work, such as Feeltrace (Cowie, Douglas-Cowie & Savvidou, 2000) and Geneva (Scherer, 2005), have classified as passive, i.e. with a low degree of control, and low levels of arousal. On the other hand, anger and joy are both feelings referring to the sphere of emotions characterised by a high degree of excitement.

In order to experiment a design adaptable to emotion-related aspects, we decided to design a Web site aiming to provide services to people interested in readings. The content provided consists in books and poems by English authors.

2.1 Pragmatic Qualities

Regarding the pragmatic qualities, we have to consider that long-term interest in a Web site is not always assured, once a user has been intrigued and motivated to interact with it. It is necessary that the aesthetics and the appeal be supported by both pragmatic and hedonic criteria to ensure a viable user experience over time, and to be sure that this site will always have a positive feedback from users. These guarantees are provided, first, by known criteria supporting usability and accessibility. We have aimed to develop a site that is easy to learn and remember. For these purposes the layout was designed to make its functions and aims clear. In addition, the content was selected in order to make it appropriate and compliant with the site goals. The public and private pages provide additional information to show and explain the different features offered.

The various basic aspects characterising the user experience concept have been addressed in various ways. The search for attractiveness has resulted in several choices of graphics and type of service provided and its usefulness. Indeed, a previous study (Hartmann, Sutcliffe & De Angeli, 2002) proposes a framework for attractiveness that considers five aspects: content, aesthetics, usability, reputation, and customisability. The definitions of the graphics may vary depending on the four types of emotions, but for every layout we have tried to follow the basic design criteria of balance, clarity, simplicity, affordance. We tried to avoid the inclusion of too complex functionalities or to create too heavy graphics, in order to make the Web site clear and easy to navigate. Such clarity and simplicity have been chosen deliberately to respond to the type of user target. As it provides a service that makes literature content available, it was considered better to design it to be enjoyed by the widest possible range of users, from the most experienced with the network and navigating through Web sites, to people with scarce experience in Web services.

The graphics are primarily a classical type, which is simple and straightforward. This guarantees clarity, simplicity and affordance, that is trying to make it easy the perception of the site, its functionality and the different sections. The Web site seeks to impart a certain degree of interest, pivoting on the clarity of layout, content, and simplicity by which to access it.

The navigability of the site was also analyzed to identify the most intuitive and best suited solutions to each of the four sections (one per emotion) in which the site has been divided. Navigation bars are easy to localize because they are graphically differentiated from the rest of the page. There are indicators (bread crumbs) of the

path followed during the navigation and there is always a link to allow an immediate return to the home. There are three navigation bars, a side bar supporting the main tasks, another central one specific to the private area, and another smaller side bar is containing secondary information. The left side navigation bar changes its mode of interaction, according to the emotion of the site where you are. In the sad case, it is represented by a vertical menu with tabs, in other sections (anger and joy) it consists of a drop-down menu. The reasons for these differences depend on the type of feeling to represent. It has been considered that a static menu, such as tabbed menu, is more suitable and compliant to a quiet and relaxed state of mind because it does not imply any dynamism. In the anger and joy sections, however, we have preferred a drop-down menu, because both feelings refer to the sphere of emotions characterised by a high degree of excitement. It was therefore considered appropriate to associate these with a type of menu, which is also indicative of dynamism.

2.2 Hedonic Qualities

The credibility of a site, the presence of contact information, along with information about the associated organization increases the levels of satisfaction and trust, which stimulate and promote possible future use. The requirements listed so far, pragmatic, aesthetic and credibility, are necessary but not sufficient. We need to ensure long lasting use and make sure to fully support user experience effectively and efficiently. Satisfaction must therefore include all aspects that affect users, ranging from pragmatic ones to hedonic and emotional ones. For this purpose, the guidelines must satisfy certain psychological needs. Personal needs include identification with the service, the sense of belonging and socializing that can be achieved through the provision of certain features. The site must ensure satisfaction of all the various points listed, continuously over time, and always able to stimulate a certain degree of user interest. There are some features and functionalities that support and ensure the fulfilment of such requirements: the regular presence of new elements, the possibility of helping and supporting users in personal growth, a sense of skill or knowledge acquired, the presence of tools that require the active participation of the user.

The site aims to meet three interrelated user needs: personal identification, which will lead to involvement and personal development, and social identification (membership). Involvement is fostered through forms of adaptation used to arouse interest and curiosity, providing the right information based on the user type. The textual content presented in the private part changes depending on the number of accesses. When

users perform an initial login they receive information on mode of operation of the site, otherwise they will be informed of the presence of certain news. The news concerns the presence of new readings, divided between poetry and books, new suggestions for personal readings, or the presence of comments, which have not been viewed yet. By regularly updating the content, we aim to avoid the abandonment of the site for lack of novelty.

The personal growth, at which the service is aimed, is an increase in knowledge of English literature. Another personal need, besides the involvement, concerns the active participation that leads to a sense of belonging and identification with a community. The section devoted to comments, responses on the opinions of others, or to publish their ideas, allows the users to play a dual role: one who sees and makes use of the content, the other as someone involved in the creation of further content. Its presence in the form of comments or responses to comments, ensures the creation of a sense of belonging and a way to identify with the service. These elements of interactivity, in particular the elements of social interaction, encourage the development of a sense of being an active member of a virtual community.

The ultimate goal is to provide an application that can be integrated into everyday life in order to become part of users' habits, so as to ensure an attachment over time. Thus, they become member-participant of an application, which can be customized to best meet their own needs, and provides new and interesting content corresponding to their personal profiles, and can adjust to their daily habits.

2.3 Navigation and Interaction

The adaptation relates to changes in the layout and look-and-feel. To avoid confusion and to follow the idea of stability, the navigation bars are always located in the same position. Only the right-side menu changes some attributes. Some menu items, login and logout, are present in some sections of the site (sadness and joy) in the most evident positions, or are dynamically displayed in the menu on the left side.

The reason for these distinctions depends on the most appropriate way to represent emotions. In the calm section the login and logout are included in the menu item 'Private Area', as the calm does not imply dynamism, or nervousness. The user is more than willing to observe the details of the different sections of the menu, and then to note that a login can be found in the section in the personal area.

For the anger mood, the login was made immediately apparent through a form beneath the navigation menu on the right side. This choice is motivated by the fact that

feelings such as anger, rule out the patience and calm to look for the menu item associated with the login in the specific section. It is a sentiment indicating nervous dynamicity, and thus it can be associated with a layout design that immediately displays the main features. For joy and sadness, it was decided to extract the login item in order to make it more evident by placing it above the central area.

Joy in the login section is accompanied by a graphic icon. It is believed that this section, representative of a lively and dynamic positive feeling, must clearly show certain functions and point to the right user interface elements to be consistent with both the idea of the vivacity and feelings like joy and happiness.

In the sadness section, the link to the login page is also located, as in joy, in the top left of the central area. This choice depends on the way to interpret the feeling of sadness. The mood is a sad feeling that implies low levels of arousal, as calm, but contrary to this, we believe that with this sentiment the tendency is to pay little attention to detail, and there is a lack of willingness to spend a long time searching for where certain features and functions may be, such as a log entry into the 'Private Area'. For these reasons, it was deemed appropriate to make the login item readily apparent and accessible.

The interaction with certain functions, or ways to discover the implementation and fulfillment of certain functions changes from section to section. One main difference lies in the dynamism with which the interaction takes place. In some cases, there are pop-ups or alerts to make the interaction more lively. In other contexts, such as calm, we prefer to interact more slowly, almost statically, since it is more appropriate to a calm and relaxed state of mind.

2.4 Content

The adaptation relating to the content refers to the category of readings provided. The suggested books and poems reflect the kind of sentiment associated with the current section. For example, in the anger section, the suggested poems and books evoke the feeling of anger, rebellion or oppression or intolerance against certain historical periods; the literary themes provided express anger towards certain social issues. In the calm section, there are poems and books referring to the Zen theme, hymns to nature, descriptions of natural scenery, fiction books, or moral philosophy and ethics. A type of quiet and relaxing reading, representative of the surrounding world without being a vehicle for social or political issues.

The sadness section contains books and poems with themes related to loneliness, social problems, introspection, or having actors as members of social classes in distress.

In the joy section it is instead possible to find plays, poems exalting the beauty of nature, the various expressions of positive feelings and optimism. The types of readings provided stimulate laughter or represent literary forms of entertainment. The adaptation of the content affects not only the content offered, but also the style and register of the writing and the language used, so that it is more appropriate and complies with the feeling represented.

2.5 Graphics

The graphics also show some adaptations. The various elements of design were combined in connection with the specific colours. The colours, in particular, have been chosen taking into account the associated theories and analyses carried out in the field of design and graphics.

The elements that undergo major changes in the layout are buttons, background images, navigation bars, the information structure, the presence of icons or simple textual explanations.

These adjustments are the result of a number of reasons arising from an interaction between the elements of graphics and emotions that may arise from their combination.

3. The web site adaptable to emotion-related aspects

In this section we provide more detail about the concrete design adopted for each of the four emotions selected. The purpose of the Web site is to allow users to read material (such as books and poetry) or just browse lists of available readings, with the possibility to know related information and detail. The Web site has both a public and a private part. In the private part it is possible to create a personal collection of books and poems, write comments and opinions on the readings, access comments written by other members, receive suggestions about potential interesting new readings and so forth. The content is provided by downloadable books in PDF format and texts of poems that can be shown on request. As we mentioned, the navigation bars are always located in the same position. Only the right-side menu changes some

attributes. Some menu items, login and logout, are present in some sections of the site in the most evident positions, or are dynamically displayed in the menu on the left side.

3.1 Anger

The support for this emotion has been designed in accordance with the following characteristics:

Graphics. Dark colours with strong contrast were used, in particular various shades of black, bright red and white.

There was no structure used for the background because it implies something orderly and balanced, which contrasts with the type of feeling.

Content access. The content related to books or poems is accessible through images, representing authors, to browse through the use of arrows.

Each image is accompanied by some background information on the reading, the title and author (see Figure 1).

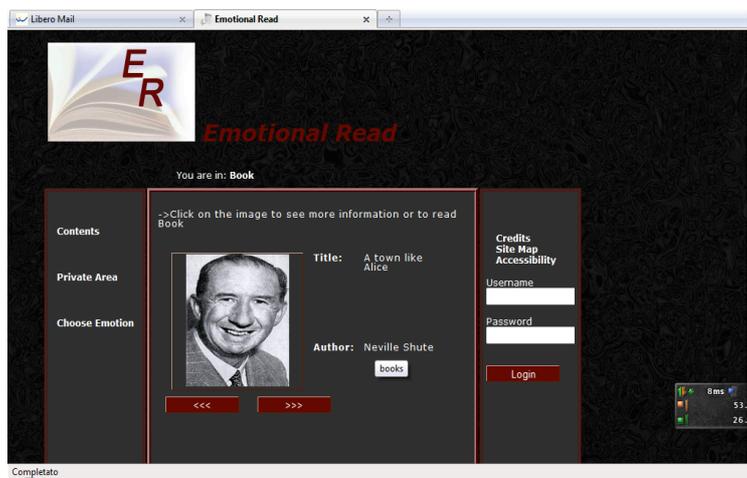


Figure 1. Example User Interface for Anger Profile.

This way of interacting was chosen in such a way to have an immediate idea of the reading from the title and author, and allow the user to access, if interested, at a later time, further information about the reading. If users want to make another choice, this is possible through a system of sliding images with important information. Other types of content, such as comments, are shown through a simple page with a side scrollbar. At the end of the comments, there are two buttons that allow users to respond to comments or read the item to which it relates. When interacting with the site there are pop-ups and alerts. These techniques were chosen to give the idea of dynamic

changes over time, without stability. With regard to the content offered, readings (books and poetry) related to the feeling of anger have been selected.

Writing. The style used for writing is characterized by the use of periods with few commas, many full stops, short sentences. The content is easy to read with clear and direct expressions through simple words, in common use. This type of writing was motivated by the idea of representing the feeling of nervousness. A feeling that recalls speed, movement, tension. For this reason, short and concise sentences are more suitable.

Navigation. The links used are included in presentations with text with strong contrast to the background image. Rollover pop-up menus are used to give the idea of dynamism and tension.

3.2 Calm

Graphics. The graphics and the structure is static, balanced, harmonious and very basic. Soft colours are used: blue and its lighter shades. For the background a blurry image of clear clouds is used (see Figure 2).



Figure 2. Example User Interface for Calm Profile.

To convey the idea of order and balance the layout has a clear structure in which the various contents are included. The tables, for example, have sharp edges. There were no particular images used as icons or graphical links. The only images are those depicting the covers of books and poems.

Content access. Items are presented through book covers with all the related information (title, author, plot, ...), without any effect of magnification, or pop-up dialog boxes. Simple lists with a description of the content are used. This is appropriate

because it conveys the idea of stillness and calm. The use of tables and lists of content was chosen to be consistent with the concept of balance, which implies a calm and relaxed state of mind.

The task execution is slow: the slowness is obtained by the support of different tasks in different pages, linking a goal to each form. With regard to the content offered, readings (books and poetry) consistent with a feeling of calm have been selected.

Writing. The writing is characterized by the use of rather short phrases but with many details. This promotes slow meticulous reading. The slow pace is suited to the idea of calm, something that invokes relaxation, without excessive movement, but with time to reflect on the interaction.

Navigation. For navigation we have created a tabbed menu because it is a rather static type of menu. The links are textual without excessive contrast to the background, in order to avoid emphasis, which does not fit well with the idea of peace, harmony, and lightness. We prefer something simple and sober.

3.3 Joy

Graphics. This emotion is associated with a colourful and cheerful layout. The tiled image of a sunflower is used for the background (see Figure 3). The sunflower was chosen specifically because is the ultimate flower of light and positivity, as well as for its bright yellow colours.

The colours used are slightly bright and lively, such as orange and yellow.

The graphics involve the use of many images, icons, graphics and non-textual links, implemented through buttons.

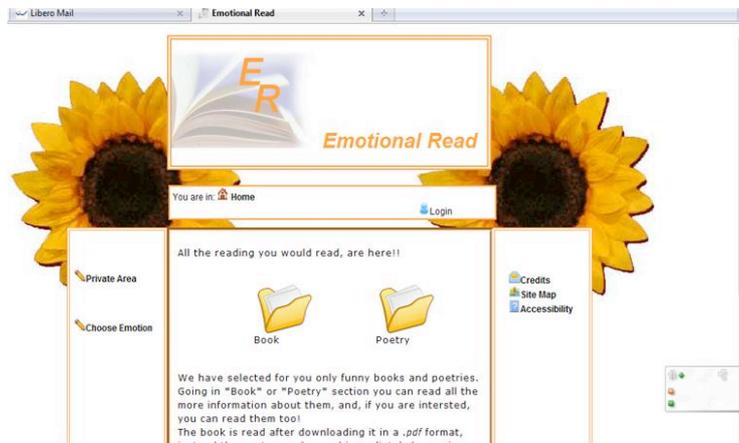


Figure 3. Example User Interface for Joy Profile.

Content Access. The content of the books or poems is shown in images with horizontal scrolling, like the anger mood. However, in this case the type of access to information and reading is different. In addition to images representing the two types of readings there are also buttons that allow users to display additional information, while the others enable them to read the book / poetry directly.

All other tasks are supported in a similar way, in order to reduce the steps necessary to perform them (read comments, post comments, edit comments). The objective is to provide access that is fast and immediate through the inclusion of graphical buttons that allow access directly to the content. The decision to build fast and dynamic interaction was chosen because it seems to correspond well with the idea of liveliness and joy, because such feelings are active and dynamic, as opposed to anger. The difference with the anger section is the different meaning ascribed to speed in task performance and it is made evident through the graphical choices, recalling the feeling of happiness. These give an overall impression of such dynamics in a positive conception.

With regard to the content offered, readings (books and poetry) evoking feelings of joy and happiness have been selected.

Writing. The writing tends to be direct and clear. We use friendly and positive expressions, which recall the emotion selected, terms and phrases that provide the idea of a certain satisfaction. This can be achieved with the right combination of adjectives and simple and short explanations promising a fun read.

Navigation. For navigation we use pull-down menus accompanied by icons. Links are made with buttons, images that are explanatory of the functions or pages to which they lead. Images take up more space on the page, and give the idea of a richer page.

3.4 Sadness

Graphics. To convey the idea of sadness the color that represents this state of mind (grey) has been used (see Figure 4). The background was created using an image of grey-white leaves. There was a preference for the use of low contrast with the use of shades of grey and purple. In this case, the layout for the content is very streamlined, almost minimalist. Edges are used to identify a minimum level of partition. These tables show only the horizontal edges of each cell. These solutions are used to communicate the idea of sadness. The graphics and the minimalist structure are used to evoke this feeling, by which users tend, in most cases, to close themselves off. This

closure causes people to ignore details, and it leads to them focusing on themselves, indifferent to external elements, graphics, or special aesthetics.

Content Access. The content is then organized in very simple structures, which contain all relevant information relating to comments, books, poems. Below this information, there are graphical buttons, in shades of blue and grey, giving access to other features: reading, download, comment response, inserts, and others.

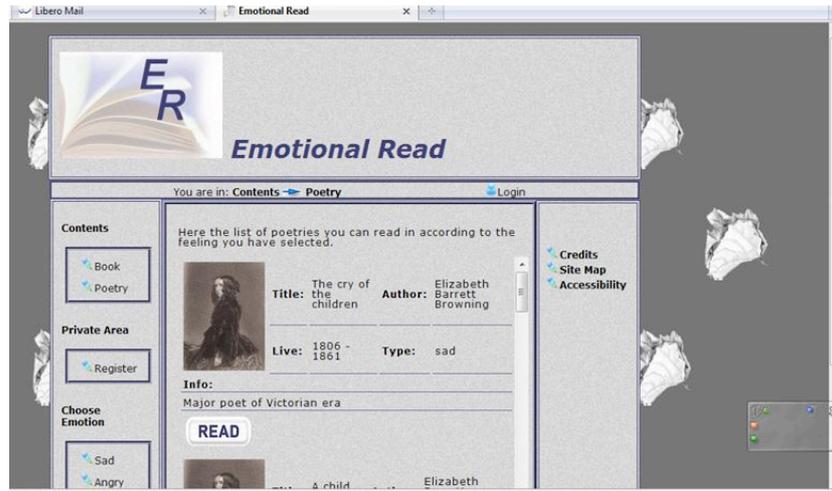


Figure 4. Example User Interface for Sadness Profile.

Writing. The text follows a structure composed of short sentences with direct and immediate explanations, self-contained, without having to extend a concept in extra subordinate clauses. Sadness has been shown to adhere to the idea of brevity, since it is considered a feeling of someone who is closed in themselves and leads to pay little attention to sentences that are too long or explanations that are too detailed.

Navigation. The idea of sadness can also correspond to a navigation structure that evolves slowly, and is not too dynamic, otherwise it would stimulate conflicting emotions such as nervousness or fun. For this purpose, vertical navigation menus were used with icons recalling the leaf motif that is repeated in the background. The aim is to prompt slow navigation, without exaggerating. Some graphical buttons have been used, but everything is simplified and easier than the graphics used in 'joy'. With regard to the content offered, readings (books and poetry) related to feelings of sadness have been selected.

4. User tests

We conducted two user studies, one formative on an early prototype and one summative on the final application.

The first user study involved twenty students from digital humanities and computer science. All of them were frequent Internet users, average age 25 years old. They had access to an early prototype of the Web site, showing a first draft of the user interfaces for the four possible emotions. Its purpose was explained to them, together with the possible tasks (even if some of them were not yet supported by the prototype implementation), and content types. Then, the users had to answer a number of questions.

One was whether the set of four emotions selected was considered sufficient for a Web site adaptable to emotions. 15 out of 20 considered the emotion set proposed enough. One suggested adding stressed, one loved, and three anxious.

One question was about the possible use of the emotions. More precisely, should the Web site support emotions corresponding to the current user emotional state or should it support a different emotion in order to help users to change their emotional state (e.g. if the users were sad then the site should try to make them happier)? The preferences were balanced: 6 preferred the same emotion, 8 were in favour of supporting the change of emotion, and 6 did not express any preference. Users also provided some small suggestions regarding the colour to use in the background images, and some of them would have liked the indication of the current emotion supported to be more explicit at all times.

The final evaluation involved ten users, once again students with frequent Internet access. They had to access the four sections of the Web site and perform some specific tasks in each of them (login, looking for some piece of info, add one poem in the personal area, ...). Lastly, they had to fill in a questionnaire aiming at evaluating the design choices implemented. In general, the design choices were commented positively. The only points that raised some concerns were in the anger section: some users did not find the use of dynamic elements such as pop-up menus, particularly relevant for the anger emotion.

We also assessed the capacity of the site to promote personal growth, in terms of stimulation, i.e. the possibility of receiving news, and to ensure a site which is more interesting over time, through the ability to provide new and updated content. In the specific case, this objective was realized by periodically making new readings

available, and continues to attract the attention of users, informing them of what's new. Personal growth which is discussed in this context is an issue related to cultural growth regarding English literature. The users gave on average a score of 3.9 on a 1 (minimum) to 5 (maximum) assessment scale.

In the discussion with the users it came out that to ensure that a user identifies with the service, for example, the site that offers literary content must reflect real interests. However, this is closely related to the personal user interests, and does not mean that everyone would find the site interesting, just because not all possible users love English literature.

Regarding membership, we consider social identification as identification with a community, and hence the idea of satisfying needs for social relations. The site considered meets these needs in a basic way, in the sense that the only instrument of social relationship is the exchange of views and comments on books, while it would be useful to add more effective functionalities such as social networking tools.

5. Conclusions and acknowledgments

We have presented the results of a study aiming to investigate the possibility of adapting Web sites to emotion-related aspects. We have reported on how such approach has been applied to a specific case study adaptable to four, well distinguished emotions, and we have reported on some user feedback. The results are encouraging since the resulting application is thus more personalized to the current user state.

This can be considered as a first step towards an ambitious goal: identifying a set of user experience guidelines for Web developers and designers. In the near future we plan to further refine what may be the core set for Web user experience guidelines and carry out more extended empirical validation. We also want to integrate the possibility of some automatic support for detecting the current user emotional state based on analysis of physiological sensors and user interactions.

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