

English Abstract

Interaction Design: blending style for interaction atmosphere

Starting from the question “how to improve interaction design using creativity and emotion”, this research propose a blending design style emerging from three main concepts: balance in design, creative process and semiotic inference in the development of emotional atmosphere of interaction devoted to visual interfaces. This thesis is divided in seven main parts: Introduction, Theoretical Framework, Experiment, Experimental research: Step 1 Creative Design Lesson, Experimental research: Step 2 Evaluation, Blend Design Model, Conclusion and further developments.

Keyword: ID interaction design, HCI, blending theories, visual interface, creativite design, semiotic engineering, inference, creativity, emotion.

1. Introduction

The main aim of this thesis is to address the question of how to improve interaction on design interfaces using creative and emotional aspects. It investigates on why the classical paradigm of HCI applied to interfaces interaction design needs new approaches to meet current interaction styles. It also suggests some alternative directions that can make new interactive artifacts more context sensitive.

Nowadays, interfaces, created by the HCI experts with functional and ergonomic objectives, today following the proliferation of communication landscapes need to be designed following new design methodologies in order to develop standardized solutions now. Interaction Design is the discipline

that deals with these new design aspects in order to foster interactions simpler and designed for specific contexts.

Three fundamental approaches are investigated during this work: design, creativity and semiotic and how each of them is related with human emotions. This thesis explores the role of the creativity and emotions for Interaction Design (ID), related to the context and atmosphere of dedicated scenarios, but also tries to understand how it is possible to evaluate interfaces designed having emotional goals.

The section on experimental research intends to investigate the potential of a *blending style of design* that introduces classical design techniques dedicated to stimulating the creative process, the inferential aspects but mainly the aesthetic and artistic awareness of the concept of balancing the atmosphere as the points highlighted by Verplank (2003) (*do-feel-know*), Cooper (2005) (*behavior-form-content*) and Veen (2001) (*engineer-designer- architect*).

The objective of empirical research is to verify if the resulting interface is better and the reasons of that. To test the hypothesis two prototypes (web interface) were produced: one made with following a standard procedure and one with applying the blending approach. The prototypes were evaluated by two different methods: the first quantitative, heuristics of Nielsen (1994) and the second qualitative, semiotics engineering by de Souza (2004).

Variables were examined in testing the heuristic violations of the principles in the different areas (architecture, graphics and programming), while semiotic is evaluated in a qualitative way trying to decode the message sent by designer to the user.

The interface made with blending approach achieved a better results in both tests. Assessments of the area dedicated to the emotional aspects were missing, but in quantitative and qualitative triangulation blend interface violated less principles by showing a better performance in the process of issuing receipt. The thesis also highlights the need for an evolution in the valuation models.

A possible future study concerns an improved set of techniques of interface design engineering for the semiotic and the development of a "general atmosphere of interaction" as a result from the harmonization of assessable aspects highlighted by Cooper, Verplank and Veen and from other elements emerging by the creative and inferential process or from some new studies.

The experimental steps are based on different theories and field of studies in an attempt to build bridges between the various disciplines involved in interaction design. They thus create a boundary zone fed by different points of views. Starting with hard science (HCI, computer science, software engineering, ergonomics, cybernetics and neuroscience) and then proceeding to the humanities (semiotics, philosophy, cognitive science, psychology and psycho-analysis), the thesis aims to raise awareness of the different expertise

that can be found in different working groups to develop a better communication atmosphere at all levels: between the designers themselves and between designers and users at every stage of human machine interaction. The goal is to propose a blending design style derived from an understanding of the importance of atmosphere in interaction flow, emphasizing the need for empathy and general comfort in common processes in virtual space.

Interface design and communication theory are closely related to metaphor and contexts, while communication itself is a generative process. There is thus a need to be creative in the construction of interactive artifacts especially if they are intended for small groups and focused contexts. Being creative can be defined, following Munari, Arieti and Peirce, as the breaking of existing rules and the generation of new ones. Even in the hard sciences, rejected until quite recently as an attitude, ability or process, creativity has, by the very virtue of its unpredictability, made its contribution by introducing new ways of seeing the world and by countering set biases.

This work, while following strict procedures of experimental science, sees the creative process as a “never-ending generative process”, which necessarily starts off and continuously stimulates technical interaction.

However, given the limited nature of the sample, further empirical studies are needed before the results can be generalized.

2. Theoretical framework

The today ID framework is cross-disciplinary and involved indeed a number of different viewpoints, among which only a few could be analysed in depth. This work is addressed to analysed some of them: design, creativity and semiotic in order to find out a “lateral” thinking in interaction design.

The classical paradigm in HCI, coming from the rationalist tradition, divides the user from the designer (Preece & Rogers, 2002). This formed the starting point in the software engineering, logic and cognitive science part of the project.

Such a paradigm was further developed by interaction designers around 1990, who wanted to explore the dialogue between products, people, and contexts (physical, cultural, historical). They tried to create a balance between function and form by looking at cultural, visceral and visual aesthetics. (Reinmann, 2005)

Bill Verplank (2004), the famous interaction designer, says that a system able to conform to user expectations has to comply with a model of interaction design that is essentially based on three concepts: do, feel and know and that together represent the fundamentals of each interaction style.

In the Verplank's vision of interaction designers answer three main questions. How do you DO? - How do you FEEL? - How do you KNOW?



Fig. 1, Interaction design, Verplank

“Even the simplest appliance requires doing, feeling and knowing. What I DO is flip a light switch and see (FEEL?) the light come on; what I need to KNOW is the mapping from switch to light. The greater the distance from input (switch) to output (light), the more difficult and varied are the possible conceptual models; the longer the delay between doing and feeling, the more dependent I am on having good knowledge.” (Verplank, 2009, p. 6).

According to his thought, the feature “Feel” allows to understand “how much of itself” explains the system, how it does it, and then how much is the benefit the user has from an emotional point of view. The feature “Do” allows to understand which modality of use the system communicates to the user, and if so, if it does it in an efficient and understandable way. The feature “Know” allows to understand if the system is able to communicate its “knowability” in a clear way, that is if it is able to transmit the proper logic of use to both novice users and to advanced users who require advanced interactions to support the detection of personalized strategies of use. These design features are addressed to emphasize what Norman claims: *“emotion plays a significant role in attracting the user and an attractive thing makes a person more relaxed and a relaxed person is better at problem solving than a tense one.”*

In this perspective the design process has to be addressed to define an interactive environment embedding an atmosphere able to triggered emotions in the user during the interaction with the elements of the system and interpreted according to her/his culture, interests, and context of use. Moreover the process of finding new interaction strategies by inferring, from a semiotic point of view, allows to recover emotions by previous interaction experiences.

New kind of devices develop great complexity of behaviour and some simple theory on what people know may be useful. A conscious consideration of what we are expecting from the people for whom we are designing is essential.

To help the designers in doing this, they drew upon philosophy, ontology and epistemology, with special reference to the studies of Flores and Winograd (1986) who argued forcibly that the time for an alternative orientation to be introduced was coming, and that the rationalist tradition has to be overpassed.

In general these ideas put together mind and body, action and experience. As Winograd said “*every representation is an interpretation*”, interaction design needs a language, language is an action and we create our world through language.

Winograd further shows how it is possible to move from a rationalistic point of view to a Heideggerian perspective in the new conception of computer design interface. Heidegger declared that cognition is not based on a systematic manipulation of representation. The interpreter and the interpreted do not exist independently: existence is interpretation and interpretation is existence.

Interface interaction tools enable human beings to act inside a virtual space. In order to act we need the body knowledge. (Dourish, 2007). In the body and in the experiences of the body (which is not to be separated from the mind or feelings) we will find the memory and the inference related to our experience. (Peirce, 1958) Interaction is communication and communication uses signs (De Souza, 2005). Therefore semiotic aspects of meaning are one of the most principal points of departure (Eco, 1984).

Moreover the contribution of Arieti and the underlie psychoanalysis studies made clear that “every concept has an emotional equivalent” so in creating the general atmosphere of interaction emotional aspects can be used to improve the interaction.

3. Experiment

The goal of the experiment was to evaluate two different design styles applied to the same web application. It was conducted in two Italian Universities, Udine (Science and Multimedia Technologies) and Milan (Mathematical Physical and Natural Sciences). The experiment had 2 phases:

Step 1: the students in Udine designed and realized two web site prototypes using two different design approaches

Step 2: the students in Milan evaluated the prototypes. The aim was to find out if and how different styles of designing interaction influenced the quality of the results. The results were measured in terms of usability (easy to learn and easy to use) using a heuristic and applying SE semiotic engineering, SIM and CEM methods.

In Udine two working groups, of five people each, all in their second year of a web technology course, accepted to take part in the experiment. One group attended the course given by Di Gaspero only, while the other attended this course and one held by Varesano. The former was called group 1, the latter group 2.

Group 1, therefore, only attended the course given by Di Gaspero. This set out to give them the classical tools for creating a web page, with the lessons, generally UCD oriented, focusing on technical learning.

Group 2, attended the above course and also attended one given by Varesano. This sought to raise their consciousness about differences in interpretation which have a bearing on interaction and identify, as well as to analyse and create ways to ensure more productive interaction. In four lessons of two hours each, the course drew upon different theoretical approaches and studies to stimulate creativity and to highlight the importance of atmosphere in computer communication and of triggering a comfortable mood interaction in the users.

Identical goals, tasks and subjects (Tourist agency) were assigned to the two groups. Both were given 30 days to hand in their assignments and there was no collaboration between them for the duration of the course.

At the end of the experiment both instructors (Di Gaspero and Varesano) found that there was an acceptable symmetry between the two ending prototypes called Biancaneve (Di Gaspero) and STM (Varesano). The web site went on line, in Italian only, for the evaluation in Milan, on June 18th. It is important to note that the principles of usability-functionality-efficiency were of prime concern in both courses.



Fig. 2, Biancaneve (Di Gaspero, Functional Style)



Fig. 3, STM (Varesano, Blending Design Style)

STEP 2. The students in Milan evaluated the two different prototypes Tourism 1 and Tourism 2, in a blind analysis. They did not know which prototype had been created by means of a simple classical/functional approach, and which one had included a blending/creative process.

In order to choose the evaluation to this point the following questions were asked: Do different design styles lead to different interfaces? In what way are these interfaces different? Does blend design help to build an awareness of what constitutes a better atmosphere in interface interaction? How can a better atmosphere be evaluated?

In Milan, at the CSLab, the heuristic evaluation was carried out by the students (in their first year of a Digital Communication course), alongside Stefano Valtolina and Barbara RitaBarricelli, while the semiotic engineering evaluation was carried out by master students (advanced HCI course).

4. Experiment: Step 1. Design and realize two interfaces

This section describes the results of an investigation using two different design styles in order to analyse the methodology used during the experiment.

The methods used for designing the prototypes were:

Style 1- classical/functional by Di Gaspero

During the course Web Technologies with doctor Di Gaspero students learned how to use programming tools and software. WT: the course aims to provide the fundamental technical skills needed to construct well-designed web applications. The course provides an introduction to basic web design and implementation topics to create web applications. The course topics include an introduction to the HTTP web protocol, the set of XML-related technologies for data modeling (DTD, XML Schema), Access and Information extraction (XPath, XQuery), Transformation and Presentation technologies (XSLT, CSS), basics of Client-side programming in Javascript, Server-side web programming basic and advanced techniques in PHP. The design method described, although it is user oriented, tends to impose a designer point of view, howbeit unconsciously, as it never uses participatory design techniques, co-creation, or other user involvement even at a simulation level.

Style 2 - Blending Atmosphere Design by Varesano

During the Varesano's course students were involved in different tasks with the goal of fine tuning the designer and user experience. To do this an attempt was made to capture a so called "better interaction atmosphere" which is a empathy atmosphere, cultural mood interaction and "sensitive understanding".

Atmosphere was communicated through the interface design with the main emphasis being on the emotions. To create a better interaction atmosphere

students were required to be creative and generative, expanding their possibilities from inside to outside, from the working group to the target users.

This new model of interaction design propose the blending of different creative design techniques, in which some elements like: awareness, group cooperation, semiotic inferences and mainly balance in design contributes to define a creative product that embeds a pleasant atmosphere supporting successful interactions .

The blend theory, or “conceptual integration” is an operation that is applied to two input spaces, which results in a new, blended space. The blend receives a partial structure from both input spaces but has an emergent structure of its own, not provided by the inputs. The blend is a theory of knowledge which also allows inferences and creative process.

Along this research I used the term blend or blending referred to blending theories developed by Fauconnier and Turner (2002) stemming from the studies of Koster (1964) and recently used in HCI by Imaz and Benyon (2007).

4.1 Diary in brief about Creative Design Lessons

As a general method the Wallas’s model of creative process described by Arieti (1967) was used and the lessons were divided according to the following phases: 1.preparation, 2. imagination, 3. Illumination-incubation, 4. develop-testing.

Some changes in part 2 was applied along the way, but because space is limited only the main part of the lesson will be described.

Lesson 1. Preparation.

During this phase the students carry out a set of comparative analysis of competing products. The aim of this phase is to make them more familiar with atmospheres already adopted in previous design projects. Each competing product has to be analysed in order to highlight its strong points, its weak points and should be described both from a user and from an expert point of view. This means that each student should first test the product identifying her/himself in a targeted user profile and then test it again using her/his knowledge in her/his domain of expertise. Finally, each student is asked to balance her/his personal results and to explain them to the others.

The preparation was also an awareness building exercise. On this first meeting the students had to make a web working group, by role playing three experts (software developer, graphic designer, content architect) and designing a comfortable virtual atmosphere for the users. In order to develop the awareness of each area of expertise and make the students see how different their own points of view, and those of user and designer, can be,

Verplank's division (do-feel-know) was used. The idea of what constitutes a general interaction atmosphere was divided into three parts: DO, FEEL, KNOW, GENERAL.

WEB SITE	DO	FEEL	KNOW	GENERAL
n. 1 www.youtube.com	10			8
n. 2 www.google.com	10			9
n. 3 www.uniud.it	7			6
n. 4 www.sony.com	10			8
n. 5 www.apple.com	8			7
n. 6 http://it.wikipedia.org	10			9

Fig. 4, example for the DO student simulation

We asked each student to fill in the column related to his role, (DO software developer, FEEL graphic designer, KNOW content architect), as well as the general one. They simulated the role of an expert who had to give us an evaluation of some sites, including web sites in the field of tourism. The **design balance** of these 3 aspects results in a good atmosphere of interaction.

We found the following interesting results:

- The general atmosphere increases when the distance between the evaluations (do,feel,know) is smaller, even if each evaluation is minor, (example: 4,6,5 is better than 5,2,10)
- The general atmosphere can be analysed and evaluated by being split into three parts (do-feel-know) and, as in gestalt theory (The whole is more than the sum of its parts, physics, Aristotle) averaged out, giving a different (general) result.
- Feeling evaluations are closer to the general result. When evaluation differences are often minor, is it reasonable to argue that the functional dimension is not the principal one? Knowing evaluations are in the middle.
- Do feeling and knowing divided into 3 give us an equal or plus evaluation of the general evaluation, (as it is never less). Favourite web sites never have the best evaluation, so why and how did they prefer them?
- Google is the best of all. In this case is it reasonable to argue that its functionality is one of the main reasons for its popularity?
- If the distance of the evaluation increases (ex 4-9), the global evaluation decreases.

Of course the sample (10 students) is too small for a generalisation to be made.

Lesson 2. Imagination

In order to understand the meaning of atmosphere and the “awareness of atmosphere concept” better, some simple exercises were used. The students listened to music, with which they had to associate an adjective and then

express those adjectives in images. Each of them came up with different ideas as to the meaning of the music and thus the feelings, emotions, atmosphere associated with it. Some of these ideas were very different while others were very finely *nuanced*. It became clear that atmosphere is a cultural, personal and mostly experiential phenomenon. How can this problem be solved? Starting from basic human emotions, sensibility and feelings, three creative techniques were chosen to stimulate ideas about a sensible communication atmosphere.

These were the creative techniques chosen:

1. B. Munari method of 'constants of Munari'
2. A. Dix 'bad ideas' breaking rules means understanding the rules
3. A.F. Osborn classical 'brainstorming' session

For the whole lesson new ideas were generated and refined which were then left to incubate for two weeks. The main goal was to develop the imagination.

1. Munari's creativity constants. Bruno Munari identified some of the constants that characterized the creative design processes. These constants are the basic operations made by the human brain and that are managed using memory.

These constants are:

- Reverse of a situation by using the opposites and the complements.
- Multiplication of the elements in a set.
- Creation of new relations between elements in a set.
- Change of colors, context, materials, function, dimension, etc.
- Merge of more things in a unique one.

At this stage in the creative ideas definition phase, the stakeholders are invited to apply the Munari constants to the bad ideas formulated at the previous stage.

2. Dix's bad ideas: this technique starts from the basic assumption that in order to learn how to apply new rules they should be first broken. In fact, to apply bad ideas helps at immediately understand which functional needs are strongly required. Following Alan Dix's bad ideas technique, the stakeholders are first required to propose some ideas that are considered bad in that they produce negative effects if adopted in an interaction design process. These ideas are devised starting from experiences gained during the previous phase. Combining comparative analysis of competing products and the basic features of the atmosphere characterizing the domain context in which the project is grounded, the students identify bad design solutions. Then the students are asked to list all the cons of the use of these ideas but also to identify some pro that could emerge during a collaborative discussion. This stage of "the creative ideas definition" phase leads to the specification of some ideas that have to be used in the stage that follows.

3. Osborn classical brainstorming, this is the core of this phase, at this stage, each stakeholder is involved in defining creative ideas according to her/his skills, background, and culture. Moreover defining creative ideas, the stakeholders find new solutions for embedding in the environment a positive atmosphere able to support the user in her/his interaction activities. Therefore, the proposed design model has not the aim to design a full usable system but a satisfactory and pleasant environment according to the user's expectation and wishes.

During this brainstorming phase the stakeholders transform the creative ideas in creative possible solutions according to the specs of the system to be developed. In this phase, the collaboration of technical and non-technical experts is very important in order to design a working solution according to the atmosphere features detected in the previous phases.

Incubation phase: between the design and the development of the system, a period of two weeks is granted to the stakeholders. In this period of time they are invited to reflect on the work done so far and to think on its further development.

Lesson 3. Illumination-development

Each students presented the final ideas with the aim of negotiating meaning in the group. After the presentation each of them refines the prototype and uses insight for the next development.

Lesson 4. develop-testing

The prototype was developed following the incubation ideas. During this development phase the more technical experts (designers, software engineering, HCI experts) are involved in the development of a set of prototypes, each one evolving the previous one, in a cycle that leads to the release of a candidate final system. The prototypes were presented and tested.

Testing phase: this phase is reported at last but it is actually a phase that involves the students during the whole life cycle of the product. The evaluation is in fact performed on all the mockups that results as output of other phases.

5. Experiment: Step 2 evaluate two interface

In this section we are going to analyse the methodology used in STEP 2.

According to Verplank's classification a number of different evaluation methods were used:

- Do, evaluation focused on usability
- Feel, evaluation focused on communication
- Know, evaluation focused on knowledge

The methods chose for the evaluations were:

2a- Heuristic by Nielsen in order to describe the usability (easy to learn and easy to use) the user receives the designer's message and develops his or her own activity, choosing the most efficient strategy to achieve the goal.

2b- Semiotic Inspector Method (SIM) by De Souza (De Souza, 2008), which detects the intention of designers in order to describe the meta-communication between designer and user.

2c- Communicability Evaluation Method (CEM) by De Souza (De Souza, 2008) focused on an interpretation of users, in order to explore the reception of meta-communication

2a - Heuristic evaluation is the most popular of the usability inspection methods and is done as a systematic inspection of a user interface design. The goal of heuristic evaluation is to find the usability problems in the design so that they can be attended to as part of an iterative design process. This protocol for usability involves having a small set of evaluators examine the interface and judge its compliance with recognized usability principles (the "heuristics"). Students used the ten Usability Nielsen Heuristic (J. Nielsen, R. Molic 1990: 249-269).

FCD course: The main goal of the course of Fundamentals of Digital Communication is to study the basic concepts and principal methods for designing and evaluating interactive, accessible, and usable systems. (Stefano Valtolina)

During this course the students were involved in studying phenomena, principles and models characterizing the digital communication in order to give them the bases for designing effective user interfaces, but also the methods for understanding the nature of work that people want to do and the environment in which they work. These studies enabled to introduce a second part of the course focused on how to evaluate the usability of interactive applications considering various methods, those based on inspection of the interface according to predetermined criteri to those that rely on experimentation with user involvement. The course ended considering accessibility, how the technologies evolve to support it, and which methods and criteria to use for evaluation in concrete case of studies.

2b e 2c –Semiotic Engineering evaluation

2b: the SIM Method in meta-communication with the observation of how a small group of users interacts with a particular web interface.

2c: the CEM Method which explore the reception of meta communication, seeking to identify, by means of user observation, empirical evidence of the effects of the designer's messages as they are encountered at interaction time.

IUM2: This master course aims to provide students with the ability to develop interactive usable applications, accessible and accepted by users.

During this course the Semiotic Engineering of Human-Computer Interaction was presented in order to study concepts from semiotics and

computer science to investigate the relationship between user and designer in designing interactive systems and the communication process that takes place among them by means of the software system. In particular two semiotic methods have been presented to evaluate the quality of this communication in HCI: the semiotic inspection method (SIM) and the communicability evaluation method (CEM). At the end of this course some case of studies have been described and some experiments were carried out by the students to prove the learned concepts. (Stefano Valtolina)

Both these methods explored two keys concepts: efficiency and efficacy.

- Efficiency: Is this interaction developed in a correct way?

- Efficacy: Is this interaction really useful for the user?

A concept like "general interaction atmosphere" could be used to tune these emotional trials on new additions, not limited to the context, form and presentation, but also involving the concepts of efficiency, efficacy and satisfaction, thanks bringing into play of new concepts such as creativity, knowledge, experience, inference and affordance.

5.1 Results

This section presents and discusses the results of different evaluations performed on the two Websites described in the previous section. In this phase, students of the courses "Basics of Digital Communication" and "Advanced Human-Computer Interaction" at Università degli Studi di Milano have been involved.

The evaluation of the two Websites has been performed using different evaluation methods. The various methods that have been applied aimed at

- i) investigating about the usability problems that may be encountered in using the Websites,
- ii) checking the meta-communication between the designers of the Websites and their users. In what follows, the two steps of evaluation are described.

The data analysis of the results are the following.

Step 2a. In this step 18 students were involved in the evaluation of the two Websites designed and developed in the previous phase of the study. The first evaluation method applied was heuristic evaluation and the principles adopted were the Nielsen's ten usability heuristics

The 10 Nielsen's heuristics may be grouped on the basis of the class of problems they belong to: perception, cognition, and errors management. The first three heuristics (Visibility of system status, Match between system and the real world, and User control and freedom) belong to the perception class. The next four heuristics (Consistency and standards, Error prevention, Recognition rather than recall, and Flexibility and efficiency of use) belong to

the cognition class. Finally the last three heuristics (Aesthetic and minimalist design, Help users recognize, diagnose, and recover from errors, and Help and documentation) belong to the errors management class.

The results of grouping the usability problems previously detected into these categories are presented in Fig. 5.

The results obtained at this step of evaluation highlight how the Website realized by Group 2 (STM) presents less usability problems than the one created by Group 1 (Biancaneve).

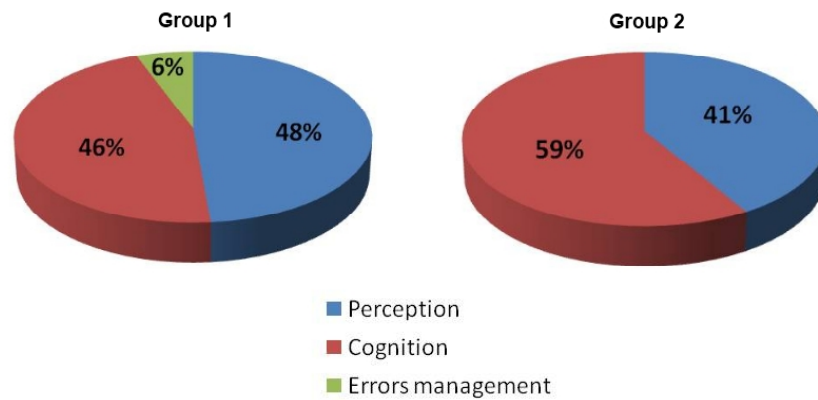


Fig. 5. The detected usability problems divided into 3 management categories

The usability problems detected through a heuristic evaluation can be also classified on the basis of the area of intervention required to fix them: graphics, architecture, and programming. According to this classification, the problems detected are divided into three groups and the results are illustrated in Fig. 6.

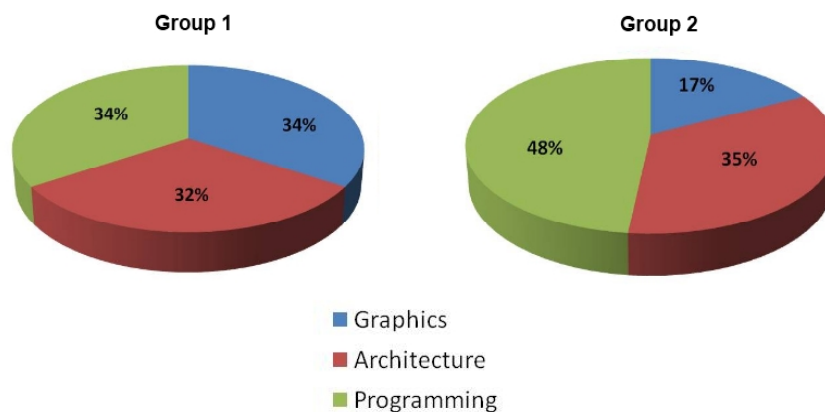


Fig. 6. The detected usability problems divided into 3 categories.

In spite of the fact that for Group 2's (STM) Website presents more problems related to programming, the final comments of the evaluators pointed out that in general the interaction with this Website is more pleasant than the one offered by the Group 1's (Biancaneve) Website.

Results from some studies published in (Thompson & Kemp, 2009) have highlighted how conventional usability evaluation methods like heuristic evaluation, and even exploratory methods like the cognitive walkthrough, do not reflect the opinions of the users. For example, in (Gomes da Silva & Dix, 2009) the authors found that YouTube failed when tested using heuristic evaluation although it is one of the most popular Web applications. Moreover, the work in presents a thesis according to which, in some cases, focusing on the usability can be harmful. This is because usability methods tend to put the lens on the usability bugs and not on the whole usefulness of an application. Innovative ideas could be discouraged by negative results and give up on plans that might otherwise bear good fruits.

For this reason, the second step of evaluation was performed applying two methods of semiotic engineering evaluation: the semiotic inspection method (SIM) and the communicability evaluation method (CEM). These two methods, going beyond the limit of cognitive engineering methods and they have not been used to evaluate the usability bugs of the systems but, to evaluate the efficacy of the meta-communication between the users of the Websites and their designers. An efficacy meta-communication is a good comparison parameter for evaluating how the conceptual model defined by designers fits the mental model of the users. The two methods have been defined in (de Souza, 2008) as applications of semiotic engineering theory to support professional HCI activities. SIM method explores the emission of the meta-communication, trying to reconstruct the messages sent by the designer to the targeted users. CEM method explores the reception of the meta-communication, trying to identify through users' observation the empirical evidence of the effects that the designer's messages have on the users' interaction.

Step 2b. SIM analyses have been performed by three students in an individual way and after that, during a debriefing, the results of the three analyses have been compared and the final results were resumed.

SIM analysis on Biancaneve Website highlighted that the colours choice affected negatively the readability of the information. Moreover, the company logo appears to many times in the same pages and it distracts the users' activity on the Website. Important information, like for example the special offers, are not enough evident and this compromises the achievement of the goal. The main goal of the Website is to choose a holiday offer and to proceed

to booking it. However, the Website does not offer directly this functionality: the user is asked to write an e-mail to the travel agency in order to manage the booking through the direct communication with a travel agent.

The results of the SIM analysis on STM Website are better in that this Website appears more welcoming than the other one. The colours chosen are pleasant and the pictures capture the user attention. The goal of the Website and its main functionalities are well working but also in this case the booking functionality is not fully available: the Website refers to another travel agency to manage the reservation of the holiday offers.

The comparison between the two analyses' results points out that the Website developed applying the new model of interaction design presents a better organized communication. The user is in fact better supported in the search of basic and advanced information about the destination s/he is interested in.

Step 2c. CEM analyses, a group of six users have been involved in the test. Two evaluators have been involved as observers and were in charge of videorecording the tests and of taking note of the communication breakdowns detected.

In the case of the Website designed and developed using the blending approach to interaction design, the number of help requests is higher than the one detected for the other Website. Moreover, this Website presents a higher number of breakdowns tagged as "I give up" or "What happened?", and this points out the fact that the user appears to be disoriented. The patterns of presentation of the tags are presented in 7 and 8.

PATTERN	FREQUENCY
Thanks, but no, thanks. I give up.	2
What happened? What now?	2

Fig. 7. The pattern of presentation of the tags for the Biancaneve Website

PATTERN	FREQUENCY
Why doesn't it? I give up.	2
Thanks, but no, thanks. I give up.	1
What happened? I give up.	2
Looks fine to me. I give up.	2
What now? I give up.	2
What happened? I can't do it this way.	1
I can't do it this way. I give up.	1

Fig. 8. The pattern of presentation of the tags for the STM Website

The patterns detected for the STM point out a less clarity and usability that lead to problems in the orientation and presents many patterns that indicate severe problems in the meta-communication between designer and users. These patterns are mainly linked to some functionalities of the Website, like the reservation.

But despite all this severe problems in the final comparison of the results STM obtained by the two steps of evaluation present a better results as schematised in Fig . 9. Some interesting datas have emerged from interviews post about CEM in which the interface STM had in general top marks because it has been remembered as the best while not having carried out its core functionality. These results allow the opportunity to ask how memories in ID are related to the general interaction atmosphere?

The Website designed and developed by Group 2 (STM), that was realized by applying the new model of interaction design, seems to be better than the one realized by using the functional interaction design approach. In fact, better results were obtained in all the three evaluations made: heuristic, SIM and CEM.

WEBSITES	HEURISTIC	SIM	CEM
Group 1	more usability problems	worse organized	less appreciated
Group 2	less usability problems	better organized	more appreciated

Fig. 9, comparison of the results

6. Blending model for atmosphere design

During all this research what has emerged clearly is the centrality of some themes: i) the general concept of interaction design as a balance of elements that were identified by Verplank, Veen and Cooper, ii) the concept of creativity and how creative process are related to ideas and awareness iii) the concept of endocetto as no-verbal activity emphasized by Arieti, iv) the Peirce concept of inference tied in with previous experience and finally all the possible relationships between these concepts and user's emotions .

The ontological aesthetic of the atmosphere could be seen from different point of views; a mix of perception, knowledge and embodiment (Aristotle: quality and attribute); a collection of cultural and personal experiences which build an encyclopaedia of signs (Eco, 1975); a process of acknowledgement; a familiar way of communicating; a personal state of 'being in the world' (Heidegger, 1950) or a phenomenological situation closely related to memories, experience, inferences, emotions and sensibilities.

It also could be said to be a "*quality without a name*" as Alexander (1979) described the pattern, a way of expressing a oneness which, due to the very nature of language, cannot be expressed:

In my opinion, at this stage of the research, give a precise definition of the basic components of the atmosphere is premature.

My intention is to study and isolate some key elements for improving the atmosphere and then check if these elements improves the interaction in ID projects.

Blending DESIGN MODEL

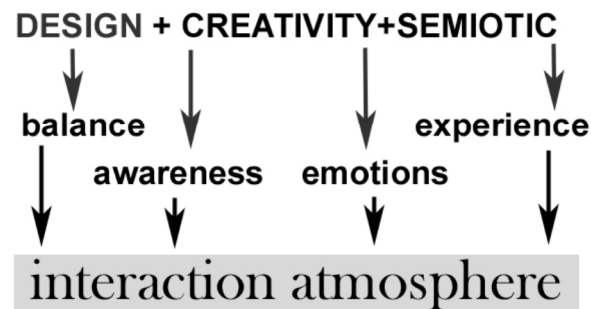


Fig. 10 Blending Design Model

As in architectural design, the concept or atmosphere is related to a space. A virtual space gives us special feelings, most of which are related to functionality because they involve the achievement of our goals. The users reach the goal in different ways through personal knowledge, remembering previous experiences (inferences) or through intuition and insight.

One of the most interesting results is that, even if the goal is not achieved, a better atmosphere is remembered and can be described easily.

Blending design model is only a starting point to analyse how to develop new design styles and we believe that our efforts must be concentrated in generative projects, generating situations which expand possibilities and sensibilities.

Working groups, coming from different backgrounds and working with different feelings, can draw upon a variety of skills. They can also raise awareness of the different roles that are needed in such groups and give rise to a creative process in the design method which should help them to find a creative and generative solution during the interaction.

The role of the body is quite important, our body being that which gives us our experience, and building bridges between disciplines is like building bridges between people coming from different experiences. Building a comfortable mood means that the user feels safe, in a protected environment, at home in the interaction atmosphere.

Feedback from the SIM/CEM evaluators about the general pleasantness of the atmosphere is missing but they suggested that a question about this should be put in a particular part of the questionnaire (in the section on graphic and visual design) in the future.

The blending based design of this study sought to give some hints on how to improve interaction, while summarising all the suggestions that the evaluators sent to the designers.

This research shifts de Souza's semiotic engineering approach from a theoretical and abstract level to a proactive level. This new design style, composed by blending and creative approach, are showing how SIM and CEM methods should be used as operative examples of evaluation of communication\reasoning knowledge in order to insert on the design process some aspects related about general atmosphere, feelings and emotions.

Though the results are clear, the initial hypothesis is not really confirmed. However, despite this, some interesting facts arose. Even if STM, which was created with the help of a blending design style, was classified as having a lot of functional problems and it was felt that the users did not reach their goal, the feelings about usability is higher than in Biancaneve.

Why is this happening? The general atmosphere could well be considered part of the answer. This needs to be explored in more depth and can give us a number of new fields of investigation for the future.

Given the experimental environment, the interpretation of events is certainly open to debate. It may well be that users could experience frustration in Tourism 1 over the long term and consequently the overall results may actually be very different.

In the interview post, there are no special sections devoted to atmosphere, but we obtained better results for STM from qualitative descriptions. In the triangulation of all the results (qualitative and quantitative) it appeared quite clearly that users preferred interaction with the STM interface.

Our research is limited to one web interface interaction and cannot be generalized but we feel it is very important for the future to investigate the concept of atmosphere in interaction in greater depth.

7. Conclusion and further developments

This research set out with two simple hypotheses that different design styles influence the style of communication and also that design should be improved by emotional aspects. We found that using a blending approach, focused on the building of a better interaction atmosphere emerging from the balance of the aspects (*do-feel-know*), the interaction seems to improve, but we also discovered something more.

From an analysis of the results in design and evaluation we brought to light new needs and new possibilities offered by new style in HCI and by new evaluation investigation.

The first Website was designed using functional approach to interaction design, instead the second one was based on the blend approach presented in the research.

According to two usability analyses carried out on the final Websites, the application designed using the blend method is more satisfactory than the one designed using functional approach, in that, its space of interaction better reflects the mental model of its visitors in supporting the achievement of specific goals.

Current studies are addressed to redefine a semiotic method of analysis (CEM) in order to better evaluate feelings and moods of the environment from an “atmosphere design” point of view. The idea is to find a method for understanding if the designer has been able to communicate to the user the atmosphere s/he designed. Therefore, the goal of this improved semiotic method of analysis is to evaluate if the message sent by the designer is correctly perceived by the user and at the same time, if the triggered emotions have been felt by the user according to the interaction purposes of the designer.

This research opens up new insights on several fronts:

1. New design styles that offer the possibility of including experimental setup dedicated to the integration of the three project areas by promoting team work with multi disciplinary consequences also in teaching. The use of blending design style as a mixture of different techniques, it is really very large, therefore, this research represents only a starting point, or rather the beginning of a viable.

b. Definition of a general atmosphere of interaction as a set of different elements. In his more theoretical aspects, the intention is to contribute to the evolution of the concept of effective communication (now composed of usability, accessibility, ergonomics) in order to integrate it with the concept of a general atmosphere of interaction, where the former is always bound to functional aspects (related to the achievement of objectives) and the second lets you interact with situations more complex, involving both emotional and unexpected use.

c. New perspectives in the evolution of types of evaluation to be dedicated to different aspects of the interaction. I would like to propose to De Souza future development of semiotic analysis in evaluations by introducing aspects dedicated to the concept of general interaction atmosphere and emotion in order to achieve a more articulated the concept of atmosphere to be included in the analysis of the interviews post CEM and extend this effect future evaluations semiotic.

The technological landscape offers us new possibilities, the boundaries between hardware, software and services are blurred, the products in the network have already deployed their generative potential radically changing our lives and other new ideas will continue this transformation.

Over time the body experience (Dourish, 2004) will be incorporated in the use of increasingly mobile and smart. This research in designing for mobile technologies: smart phone, pod, pad, tablet, etc., defining new criteria for emotional design activities at multiple levels.

Of course I am aware that finding a unifying principle that describes a process of recognition at this level involves so many disciplines, from the scientific to the humanistic point of view, to be exposed to enormous criticism, so let me just sketch some concluding remarks.

The *endocetto* (Arieti, 1967) is an activity not verbalized nor measurable but instead we argue that it is assessable to the extent that a particular group membership would prefer a project that apparently (at a superficial examination) did not differ substantially from another, but rather (as in our case) also has minor functional. (Gomes da Silva, 2007)

Despite the claim lacks the feel of the assessment, these issues make us believe that something different was produced even though it is impossible, given the limited sample, to arrive at a generalization. I think therefore premature to develop a theory or describe in detail what they considered the evaluators to define more or less usable interface and such inferences have been drawn to enact better interaction.

The atmosphere quality is linked to the quality of inferences that can activate, to past experiences and emotions that they are capable of arousing. The Arieti's *endocetto* is an organization in which early experiences, pictures of past events and perceptions remain below the conscience or because they can not be removed or transformed into verbal expressions, the inferences they make it possible to make choices emerge. In my opinion, those decisions are facilitated by the atmosphere of general interaction..

The goal is to understand whether some activities, the exclusive domain of science, let them engage in some aspects of processes such as "emotional", as a variation from which to take advantage. A new kind of humanism, technology that offers a view of science to integrate and harmonize human activity in the knowledge that the more advanced modes of contemporary communication flow from bottom-up models.

Interactive communication has seen the birth of new products and services that are followed as many theories about, such theories are passed from UCD to the involvement of the machine in the process forgetting the simplest aspects of the human.

The anthropological changes are now explicit, evident in everyday life, the interaction produces the cognitive changes and, in humans, new ways of doing things with technology produce new ways of thinking, this paper proposes an approach blending (creative, artistic, emotional) on issues that remain long the domain of the hard sciences.

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references are part of the thesis, see PDF