

Affective Systems in Human-Centric Intelligent Environments

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1. ABSTRACT

The interaction with intelligent environments becomes more and more part of our everyday life. Their potential to shape, improve and change the wider social, cultural and creative context - the fabric of society - increases dramatically.

The beginning point for this research is the today findings on the human emotional intelligence, on the investigations of the role of the affects in the interaction design and on the different cultural approaches to the communication. In particular I want investigate the role of the physical embodiment, such as facial expressions, gestures. In general relationships between body parameters and bodily experience in evolved bodies should be considered extremely important during the evaluation as well as a critical analysis on the preference towards consciousness has to be done. I are investigating evaluations methods that could be helpful to investigate and explore the relationship to pre- and unconscious brain processes and emotional behaviours.

The evaluation of these systems, as for many other technology-based systems, should rely on opportunities of promising quality of life improvements in today society, not only as way to emancipate people from task and duty in an old philosophical approach to technology but moving forward to a pragmatic post-modern realism. How technology system could leverage on affects to relief from social pathologies and modern spread out diseases like depression [2], alienation, solitude. For that reasons our aim is the experimentation of novel, human-centered systems system that could scratch a little bit more the surface of the human emotional inner-world.

Keywords:

Affective interaction, human behaviors, human-centered, software applications, artificial intelligence, invisible computing, Kansei, design, experimentation, human factors, communications paradigm, unconsciousness, lifelong learning.

2. INTRODUCTION

The interaction with Intelligent Environments [1] becomes more and more part of our everyday life, their potential to shape, improve and change the wider social, cultural and creative context - the fabric of society - increases dramatically. We define 'Intelligent Environments' as those that seamlessly incorporate the thoughtful and insightful use of computer technology to improve and enrich everyday life. As Intelligent Environment Group at MSR we want to investigate and find completely fresh view of the interaction between humans and technology; rethinking how computer technology should be used in the future to maximize the benefits to individuals and society. In particular

the interest is on how Intelligent Environments can be fashioned to fit people's need for creativity, pleasure and affects. The interrelation between Information technology and culture has radically become a centripetal process and has increasingly speeding up the transformation of culture. Therefore the traditional boundaries between the cultural spaces of everyday life and the technical domain are blurring as technology also is rapidly becoming part of the experiences in everyday life - if not a platform for experiences as such.

For that reason I think that the beginning point for this research is the today findings on the human emotional intelligence, on inner-brain processes, on the investigations of the role of the affects in the interaction design and in the tentative to cross different cultural approaches to the communications. It is quite evident that emotions, affects, intimacy, personal relationships, or moods play a significant role in human interaction.

For that I am interested on a first set of questions. In what way and how far is it possible to integrate that into an Intelligent Environment? How to get users involved with interactive applications leveraging on affective expressions? How enabling user to communicate their emotional states?

Another set of questions that I would like to get some answers is a longer term tentative to implement and programming real artificial affective systems able to emulate human-like emotional process. How I can give to machines some abilities of emotional intelligence, including the ability to recognize, model, and understand human emotion, to appropriately communicate emotion, and to respond to it effectively?

An efficient knowledge on digital representations could by a key issue for have a more "natural" interaction and for build and experimenting a seam fully awareness, with the people around us, our family, our friends.

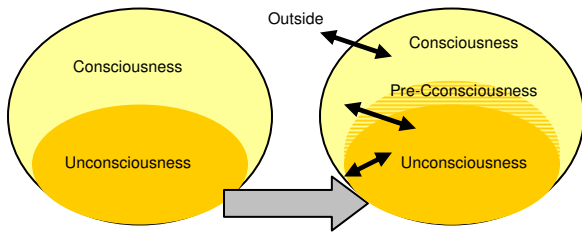
2.1 INTERACTION MODELS

It is fundamental locate and define the theoretical implications of these up-and-coming new application domains in the explanation of the affective and aesthetics properties, with and around technology. Schulz van Thun proposed the "4-ears model" as a model that could describe well the different aspects of the communication involved during interaction



One of the things we assumed as true in the 4-ears model is: human perception and resulting behaviour is often influenced by both levels in the communication: knowledge (in general 'conscious part' = content) and emotions (in general 'un- or subconscious part' = appeal, relationship, and self disclosure). In order to have possibilities to effectively influence the behaviour of a receiver, it is necessary that to try to understand each other at all level. In particular, to be congruent throughout the communication, one should formulate messages in a way consistent with one's personality/attitudes and values.

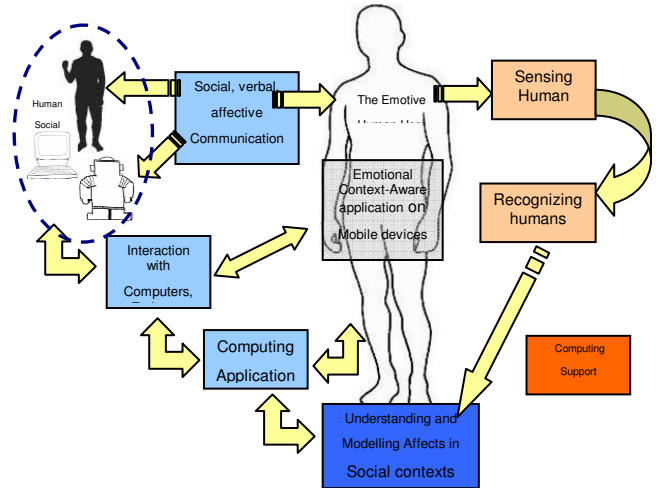
It is consequent that the sort of communication should be in agreement with the requests of the situation. The integration of multiple, multimode can enable a type of communications that is neither biased towards cognition, nor biased towards awareness. I am interested on this kind of experiences and an example of experience users will have of such combination is the Kansei Communication so mainly based on the inclusion of non-verbal information throughout interaction. [3]



Dualist view and emergent view of the relationship between consciousness and unconsciousness.

Having in mind the previous attempts in Artificial Intelligence and considering how challenging could be facing this problem, I would like to investigate on a strong representation.

It seems promising the tentative to create a model representing an affective/emotional interaction considering the conscious and unconscious relationship [3] as well as the social relationship and influences of the embodied interaction [4]. For that reasons I would like to investigate on if/how I could integrate the two aspects in a loosely liked way with the cognitive models or at least in novel ways.



A human-centric affective-aware system model

Building inadequate models, and exploring their capabilities and limitations is often an essential part of the process of learning how to design more complex and more satisfactory models. If the today emotional/affective models are lacking seems to be consequent to an too much strongly cognitive-oriented approach. For that reason the addition in some ways of new components like the "unpredictable" behaviour and/or the "inner part" of the human beings, like the subconscious, could be an interesting direction of investigation toward improvement of the capability of interaction of the environment.

3. EVALUATING SYSTEMS

In a planet populated with a minority of rich and well heeled populations and a majority of underprivileged and poor people, it could be awkward to talk about on improvement of quality of life in likely "post modern" society. If the meanwhile our countries and everybody of us should take care and try to help to remove difficulties and improve the status of the lacking population, I could already see some novel pathologies that are growing considerably. Social pathologies and modern diseases like depression [6], alienation, solitude, solitude are strongly related with our perception of the daily life, with our health, with our joyousness and the aim to investigate if I could address, even if partially could be a remarkable objective.

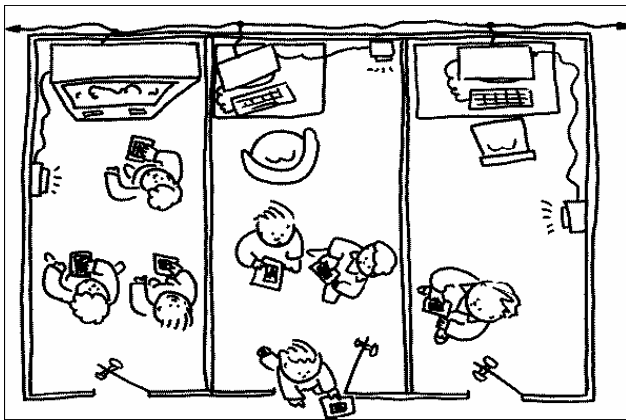
This is why it could be very interesting evaluate these systems, as for many other systems, on how many opportunities of quality of life improvements in the modern society they can provide and support. In that sense we mean improvements not only as ways to emancipate people from task and duty but moving toward to a pragmatic realism that could support the idea to have sophisticated version of the idea of a return to simplicity [8]

The research methodology applied is based on design and technical probe implemented interacting with people during the research investigation. Individuals and social groups should be involved in all stages of the design process, going from a cultural probe used to write documentation about their lives and thereby provide us with design feedback, via participatory design methods, to finally, end-user evaluation of the final system.

Another key point that I would like to investigate is how technology systems could leverage on affects, and so on affective

systems, to relief from social pathologies and modern diseases like depression, alienation, solitude? To answer that, I am looking at the experimentation of novel, human-centred systems that could rub the surface of the human emotional inner-world providing some relief and improvements in the daily life. In this direction, novel technologies have to be developed, to achieve these benefits tackling the problem considering all the issues involved: social issues, assistive issues, organisational issues, entertainment issues and last but not least philosophical issues.

In the other side, entering in the personal affective spaces it could appear a manifest intrusion to the personal and intimate space of the human being conceived as an intelligent and emotional entity. For that reason, an important characteristic a system should be the smaller intrusive footprint in the people everyday life. Affective design, novel and essential artefacts, and a strong knowledge of the social behaviours could help a lot.



Even in small environments like the home could involve very different categories of users, in different application scenarios, ages, relationships

The communication mechanism and the available interactions should take care of security, privacy and of course of eventual moral issues in order to be trustworthy with the user during the overall experience what I can collect through social, psychology, ethnographic studies.

Another important characteristic is the flexibility of the system to adapt to different situations, scenarios, and capabilities: large categories of people with: different ages, gender, culture, social extraction. In particular I am interested in systems that could interact and/or mediate between 3 different entities: people, computer and robots.

Beside the participatory design methods, I think that could be interesting to investigate the failures of the Artificial Intelligence systems in the capability to learn in an automatic way through the collection of information and/or experiences of the users. The collection of information from life activities seems to be promising.

The gathering of information about the body experience, about the recording of noteworthy moments of the daily life is opening novel possibilities for better understand the human behaviour and the value of the daily actions from an emotional perspective. Systems to collect everyday memorabilia could provide a way to investigate on our selves: for research, to learn, to express our

intimacy, to communicate, even if in a non deterministic way, our affects.

On that direction, as in our brain, a similar system has to process a multitude of information fed into on a daily basis. In the information gathering processes and during the subsequent interaction, a system will have probably to behave like human gathering knowledge processes involving selectively destroying the 'chaff' to leave the 'wheat'. As in natural evolution, one definition of intelligence would be the 'effective selective destruction of information to create useful knowledge' and/or of significant memorabilia.

Finally, an affective system should help in improving our knowledge about whether is there any relationship between emotional states and bodily experience.

4. SUMMARY

In conclusion, briefly I could recap the most important concepts that I touched in this brief introduction.

In the aim to take a fresh look on how intelligent environments can be fashioned to fit people's need for creativity, pleasure and affects, I would like to investigate how we could create/build and design intelligent environments with affective capabilities. The beginning point for this research is the today findings on the human emotional intelligence, on brain functions, on the investigations of the role of the affects in the interaction design and in different cultural approaches. I think that the use of the body, such as facial expressions and gestures, is important as well as a critical analysis on the inclination towards consciousness has to be critically reviewed.

I am interested in methodologies for evaluation that are effective to look into and search the relationship to pre- and unconscious brain processes and emotional behaviours.

Beside that it could be received with pleasure the possibilities of improving the quality of life in the modern society not only as way to emancipate people from task and duty in an old philosophical approach to technology but moving forward to a pragmatic post-modern realism.

How technologic affective systems could leverage on affects and relief people from novel pathologies and modern widespread social diseases. For that reasons my aim is the experimentation of novel, human-centred systems that could scratch a little bit more the surface of the human emotional inner-world

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