



tion when interacting and experiencing products, which is correlated with the appreciation of the product and of its attributes.

An issue that is interesting to address concerns how we perceive products, and what are our elicited emotions and emotional behaviors during the interaction with products. In so far as we are able to understand the human emotional response with respect to some product attributes, we can plan to tune those attributes until the emotional response is the desired (positive) one. In fact, designing products with the intention to evoke or to prevent elicitation of certain emotions can be facilitated by an understanding of emotional processes [2].

The study of emotional responses is closely related to the user interaction with products, and with the experience that users make with products. Nowadays, it is gaining ground the so-called User Experience Design (UXD), which is part of the design of a new product [3]. The design team must deal with the design of the experience of a person using and interacting with a product, so as to optimize his/her enjoyment, satisfaction and positive emotional response. Therefore, an issue that we have to study is the emotional response of users when experiencing products for the first time, or even during the prolonged use of a product. In order to study the emotional response, we first need to investigate how people experience products, which happens through their senses (vision, sense of touch, hearing, smell and taste), and the emotional experiences they undergo.

Recently, many research works have addressed emotions and the relations of emotions with the perception of the world, have classified emotions and have also defined methods for measuring emotions, which include psychological methods, mainly based on self-reporting; behavioral methods, based on the analysis of facial expression, gesture, and posture; and human body measured parameters as heart rate, skin conductance etc [4]. Understanding how we can detect and measure the type and intensity of the users emotions, would allow us to objectively compare the effects of design product attributes that elicit specific emotions.

The subsequent step in the research approach is to understand the correlation between product attributes and the elicited emotions (Fig. 1). Understanding this correlation would allow us to understand how a product can be designed in order to evoke elicitation of certain emotions.

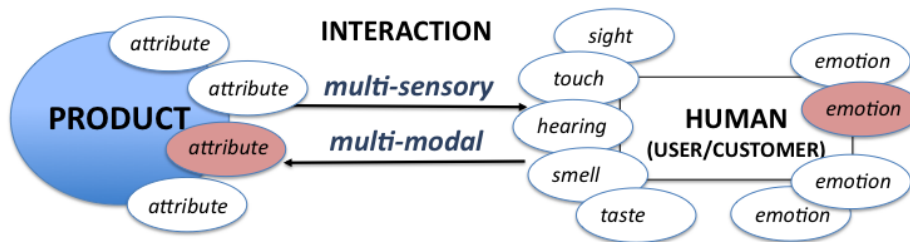


Fig. 1. Correlation of product attributes and elicited emotions.

Recently, several studies have focused on the emotions elicited in humans during the interaction with a product. In particular, **Emotional Engineering** is a methodolo-

gy that studies quantitative parameters of the future product (attributes of the product “to-be”) that generate physical and physiological effects during the interaction, which are perceived as emotionally relevant [5-7]. The design process aims at optimizing these parameters, in order to elicit intended (positive) emotions.

Emotional Engineering (E-E) is multi-disciplinary and multi-domain in its nature. It is related with two disciplines: product design and cognitive sciences. The first discipline is focused on the methods and process for the ideation and creation of effective and possibly successful new products; the latter deals with human aspects during the interaction with products, including the study of perceptions, behaviors, feelings, reactions etc. Therefore, by synthesizing, E-E deals with the interaction of humans with products.

Recently, the author has proposed an emotional engineering methodology based on Interactive Virtual Prototyping, which has demonstrated to be effective for the evaluation of the user experience already in the early design phase [8, 9]. Interactive Virtual Prototyping consists of the simulation of the behavior and use of a product, which allows the evaluation of the user experience, and the compilation of a list of specifications to use for the product design [10].

Some attributes and interactive behaviors can be simulated and tested starting from the very preliminary ideas about how a product should be, and how it should behave. The method aims at giving the designers the possibility of evaluating in real-time the users' experience during the initial conceptual design of a new product. The focus of our study is on the interaction of the users with the newly conceived product, and on the effect that this interaction has on users, in terms of satisfaction and emotional responses. The aim is obtaining in advance, and predicting in simulated environments the human emotional reactions.

The method allows testing various interaction experiences and external product behaviors, and identifying the ones that people like more. This method can be used to test proposed novel interactive solutions with groups of target users, when the product, not yet fully decided and designed, is at the concept level.

So, this method allows us to capture the best final behavior perceived, and to characterize it in terms of physical, quantitative parameters. Those are passed to the design team as technical specification for the detailed design. In this way, the risk of designing good functional products but unsatisfactory from the point of view of the experience of use by the potential customers are minimized, as well as the development time and costs are reduced.

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