THE USE AND IMPORTANCE OF EMOTIONAL DESIGN IN CONTEMPORARY DESIGN PRACTICE

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ABSTRACT

THE USE AND IMPORTANCE OF EMOTIONAL DESIGN IN CONTEMPORARY DESIGN PRACTICE

This thesis investigated emotional design concept. Products evoke emotions in people. This thesis suggests that emotions are at a basic importance for the success of a product since they influence product evaluation, purchase decision and product experience of users significantly. It is also claimed that, by the means of emotions, a higher user satisfaction, product longevity and a better product performance can be achieved, which will result in an enriched life.

To provide an insight to emotional design concept, thesis investigated how products evoke emotions in people. Two recent design projects based on the traditions in emotion research were investigated in depth. Learning to Talk with Your Body project that is based on Jamesian tradition revealed that products could be designed to elicit predefined emotional responses in users. Emotionally Intelligent Alarm Clock project that is based on the cognitive tradition showed that it is possible to reach a higher user experience – thus an enriched life – through emotions.

Aesthetics was considered as the most appropriate term encompassing the emotional attributes of products. Recent studies showed that, besides being appealing, aesthetic (attractive) products are perceived to perform better. Aesthetics generates a positive motivation for the user by contributing to the meaningfulness of the product. Thus aesthetics was accepted as a part of function. Roles of form, material and color in evoking emotions were investigated.

Detailed observations about the emotional experiences of users with products and environment are fundamental necessities. Observing a user in a holistic structure, within a framework of a relational environment instead of evaluating user's isolated performances in isolated activities will give a better understanding of user emotions.

ÖZET

ÇAĞDAŞ TASARIM PRATİĞİNDE DUYGUSAL TASARIMIN KULLANIMI VE ÖNEMİ

Bu tez çalışması kapsamında, duygusal tasarım kavramı incelenmiştir. Ürünler, insanlarda duygular uyandırır. Duygular kullanıcıların ürünleri değerlendirmesini, satın alma kararlarını ve ürün deneyimlerini önemli ölçüde etkilediği için bu çalışma duyguların bir ürünün başarısında temel öneme sahip olduğunu ifade etmektedir. Ayrıca duygular aracılığıyla daha yüksek bir kullanıcı memnuniyeti, uzun ömürlü ürünler ve daha yüksek bir ürün performansı elde edilebileceği iddia edilmiştir. Bu tür kazanımlar hayatı daha zengin kılacaktır.

Duygusal tasarım kavramının anlaşılabilmesi için tez çalışması ürünlerin insanlarda ne şekilde duygular uyandırdığını araştırmıştır. Duygularla ilgili araştırma geleneklerine doğrudan dayanan iki tasarım projesi ayrıntılı olarak incelenmiştir. James geleneğine dayanan Learning to Talk with Your Body (Bedeninle Konuşmayı Öğrenmek) projesi ürünlerin önceden belirlenmiş duyguları uyandıracak şekilde tasarlanabileceğini göstermiştir. İdrak geleneğine dayanan Emotionally Intelligent Alarm Clock (Duygusal Zekaya Sahip Çalar Saat) projesi ise ürünlerin kullanıcı duygularını anlayıp cevap verebileceğini ayrıca duygular yoluyla kullanıcı deneyiminin iyileştirilebileceğini göstermiştir. Böylece hayat zenginleşecektir.

Estetik, bir ürünün duygusal niteliklerini kapsayan en uygun terim olarak kabul edilmiştir. Yakın zamanda yapılan çalışmalar, kullanıcıların estetik (çekici) ürünlerin daha iyi çalıştığını düşündüğünü göstermiştir. Çünkü kullanıcı beğenisine hitap etmenin yanında estetik, ürünlere anlam kazandırarak kullanıcıda olumlu bir motivasyona yol açmaktadır. Böylece estetik işlevin bir parçası olarak kabul edilmiştir. Form, malzeme ve rengin duyguları uyandırmadaki rolleri araştırılmıştır.

Kullanıcıların ürünlerle ve çevreleriyle olan duygusal deneyimlerinin ayrıntılı bir biçimde gözlemlenmesi temel bir gereklilik olarak göze çarpmaktadır. Kullanıcıyı tecrit edilmiş araştırmalardaki performansından ziyade çevresiyle ilişkili, bütüncül bir yapı içerisinde gözlemlemek kullanıcı duygularını anlama konusunda daha iyi sonuçlar verecektir.

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CHAPTER 1

INTRODUCTION

1.1. Background of the Thesis

The debate for successful design is valid for every designer and design school. So is for this thesis. Towards such a goal, this thesis has been constructed on two bases:

1- Scientific evidence showing that emotions have an important role in human life such as decision making and well-being.

2- Product design can enrich life; achieve higher user satisfaction, product longevity and a better use through emotions.

Contrary to a tradition that places emotion against cognition and gives a secondary degree to emotion, today's scientific findings reveal the fact that decision making system is composed of not only cognition but emotion and cognition together (Norman 2004). Emotions direct many of the everyday activities people perform. This study considers emotions as an important part of successful products. Emotions are a very important and inseparable part of human life. Emotions both color life and serve as a limitless source of information used to evaluate the environment and situations (Ekman 2003). This mental activity is evolutionary-developed and has helped human beings survive for ages.

This study explores the mechanism of how products affect the users emotionally from the very beginning of the interaction at the pre-possession stage to a long-term use. Study gives an emphasis on form, color and material.

"*Emotional design*" term was selected to be used within the thesis for two reasons: First, to reflect the current issues about 'emotion' in design sphere and second, to benefit from the familiarity of the term 'emotion' in daily language to represent the related 'affective phenomena' including the terms "*emotion, sense, feeling* and *affect"* with ease of understanding and coherence. Since these terms have similar meanings and are used interchangeably for each other in daily life these four terms will be used throughout the thesis to describe the responses and sensations evoked in people by products when it is needed.

This thesis is investigating how products evoke emotions, how people respond to products as objects, artifacts and tools and how these data can be used to analyse the products from an emotional perspective.

The study begins with a basic question of design profession: "What is a successful design?" Towards this answer, study explores a newly defined concept named 'emotional design'. Emotional design concept argues that a successful design is linked to the emotions of the user. In other words, emotional design concept suggests that properly added emotional attributes to 'design' contribute to the success of the product.

Emotions take place at every stage of a user experience:

The first impression of a product: Value judgments, including aesthetics preferences, that shape the first impression of a product are directly influenced by emotions (O'Shaughnessy J. and O'Shaughnessy N.J. 2002). These value judgments are influential upon purchase decision.

User satisfaction: User satisfaction is an important part of the product experience. Emotion is an important part of the experience phenomenon (Csikszentmihalyi 1997).

Longevity: Longevity can be considered as the major success of a product. Long-term use could be possible only when the product manages to establish an emotional bond with the user. People attach to objects because of the feelings objects present (Norman 2004).

Although it is a new approach and the name has been defined newly, through the perspective of the thesis, emotional design has not been taken as a *recent invention*. Emotional design has been considered as a *late definition* of a key factor in the success of a design, which had existed in the past products, which is present in today's products and which will be demanded especially in future products.

This thesis presents a different and broader approach to analyse successful products. It takes successful products under its focus from the perspective of emotion. Besides sources of design, the thesis also utilised sources of psychology, cognitive science, and consumer behavior.

Reviews of the studies presented and comments for 'emotional design' and 'emotional attributes' in design will be gathered in the conclusion chapter.

1.2. What is a Successful Product?

What is the success of a product? How is it measured?

Is it the increase in sales? The impact on sales can be used to assess product's spread (contagiousness) and acceptability (stickiness) that indicates whether it is fitting to the market (Gladwell 2000). For example the acclaimed Italian designer Stefano Giovannoni had replied to a question concerning success and sales - in a conference during Art Decor Fair 2004, which took place in İstanbul - that 'after all the product should sell' and 'he, as a designer, does everything - in the limits of the profession - to guarantee this'.

Is it good marks taken in education or positive comments from critics? This issue points to the educational values and opinions from colleagues.

Is it awards won? Is it anticipation and bringing innovation to the market before a competitor? These issues show the professional value of the design appreciated by the colleagues and industry: Some for the present and some for the future assets.

Is it the properness to the target population, function, goal and vision of the design core idea? This issue can be figured out as the effectiveness of the research done in combination with the skill and artistry of the designer.

However, this thesis will construct its answer to the word *success* by a holistic structure of all the items above since each one of the features mentioned above has significance. But besides these features, a product should tell and make user feel that it has those features. And the media a product can favor through for such a goal is emotions.

Successful designs, according to the perspective of this thesis, are the ones with effective and proper emotional attributes. What this study suggests is that emotions are at basic importance for the communication of the product to the user. A product may be an innovation; ergonomically, functionally and technologically proper but if it still fails, then there is another question to be asked - besides marketing mistakes: "Does the product please the user? Does the product pass its assets, features and vision to the user properly?"

This is a problem of interaction and communication. Every animated and unanimated thing including products, communicate. The problem is inappropriate communication or shortage of proper communication stemming from design. That is a reason why many good ideas do not turn into successfully designed products.

Thesis's view is, simply, that successful products are the ones, which convey product assets - innovation, proper function, usability etc.- properly to the target

population selected in a meaningful way. What makes a design successful is the ability to communicate these features properly to the user through touch, appearance, feel aspects such as aesthetics, form, color and material. Through the study emotions have been taken as one of the major parts that carry a design to the success.

Aesthetics is one of the major domains housing the emotional attributes of a product. Thesis defense that aesthetics do not have to be used or regarded as make up. Aesthetics is a tool for strengthening communication ability of the product. Furthermore aesthetic values of a product have an effect beyond communication. They are one of the important elements that make a product meaningful (Hjelm 2003). Meaningfulness provides motivation to engage and cope with the product, which in the end improves product performance in user perception and establishes product longevity.

In addition to the positive effects in product use and communication, emotional attributes of a product are valid in the business and market side. Despite the power of advertising – eighty percent of new products fade away at the very introduce to the market and the ten percent of the rest in five years time. World's biggest brand failures accompanied extremely expensive advertising campaigns – successful brands have to establish 'emotional ties' with their customers through strong products (Haig 2003).

1.3. Emotional Attributes of Design

A product has emotional attributes inevitably. Any design evokes emotions from users (Gaver 1999). Analysis implies order and rationality while emotions implies spontaneity, irrationality and intuition. To Gaver, emotion is a subset of the 'irrational' in design as well as humor, play and aesthetics. That is why they are closely in touch with each other. Although irrational aspects of a design do not directly concern an artifact's utility or purpose, they strongly influence how it is experienced and used.

Design activity is difficult to define. It is neither pure art nor pure technique; it is a combination of both (Johansson et al. 2003). In addition to the function, the production process and the technical quality, form and beauty are always considered. That is why industrial designers usually take art as a source of inspiration. Johansson et al. claims that industrial design can be defined more as a question of *techne* (ancient Greek term standing for the combination of art and technique) than of technique.

The ideal satisfaction of owning and using a product is composed of a coherent combination of function and emotion (Green 1999). Especially, when, pleasure in the product aesthetics is supported by ease of use. Then the product will perform better than the anaesthetic one and have a long-term use. Therefore there is an increasing tendency in the research of emotional satisfaction and joy in use.

1.4. Topics Covered

To set up an emotional perspective for understanding the relations between emotion and design, first step of second chapter aimed to observe emotions in a basic manner. Definitions of terms related to the 'affective phenomena' including emotion, affect, sense and feeling were investigated in an etymological manner in order to link their meanings and see their similarities. A design perspective stating that awareness caused by an emotionally effective design can bring dignity and freedom of action to a person was added to the issue with the emotion definition of Richard Buchanan.

Study continued with the role of emotion in decision making, survival and well-being. Title's main purpose was to show the high influence of emotions in decisions people take – a process that was assumed to be dominated by pure reason until recent years. Scientific facts and statements were presented to show the bond between emotion and cognition and how they are closely intertwined.

Basic emotions determined by diverse researchers were listed. Verbal descriptions consumers chose to distinguish products were presented to show that products are emotionally selected objects. An instrumental study focusing on measurement of emotions evoked by products (PrEmo) demonstrated that how products are emotionally selected objects.

Following emotionally selective nature of consumers, traditions in emotion research with available related design projects were investigated. Darwinian tradition focuses on the fact that emotions evolved to help human adapt to the environment in order to survive. A design project directly related to Darwinian tradition was not available.

Jamesian tradition asserts the bodily reactions as the source of emotions. According to Jamesian perspective, what a person feels depends on what he/she is

doing. Design project related to Jamesian tradition is about educational products that express emotions in order to help kindergarten students to explore their own emotions.

Cognitive perspective takes emotions as being dependent on appraisal, the process by which events in the environment are judged as good or bad for one self. Design project related to cognitive tradition is an emotionally intelligent alarm clock, which invites user to experience the product, recognises user emotions and adapts itself to them.

Social constructivists claim that emotions are cultural products that gain their meaning and coherence from learned social rules. A design project directly related to social constructivist tradition was not available.

All the design projects were presented with their criteria, processes and results. Design projects presented in the second chapter proved that deliberate emotions could be designed into products to affect users.

Each project was reviewed in order to gain further inference and insight for emotional design.

Third chapter begins with an observation on the relation between the affluence of artifacts (including products) and emotions. In addition to history of technology and crafts, sociology and design history were searched for the observation. Afterwards development of emotional attributes in product design that started with *styling* in automobile industry in General Motors Corporation was observed. These first two titles of the third chapter aimed to stress the relation between products and emotion from a humane perspective favoring the need for creative ideas and self-expression.

Thesis investigated the role of aesthetics both in affecting the emotions evoked by the product and performance/use of the products. Because findings reveal that aesthetics does not only provide emotional satisfaction but also a perceived increase in usability – attractive products work better.

At the end of the third chapter three fundamental elements of design, form, color and materials have been observed as a strategic element of product design in evoking emotions. Through the historical and perceptual bonds with status and aesthetics, form, color and materials contribute to the personality of a product significantly.

Conclusion includes a brief summation of the concept, reviews of the projects and subjects covered throughout the thesis. Inferences for the contemporary product design profession based on the emotional design concept were given as commentary results.

CHAPTER 2

RELATIONS BETWEEN EMOTION AND DESIGN

2.1. Emotion Definitions and a Design Perspective

Throughout the thesis, the terms '*emotion, affect, sense* and *feeling'* will be used interchangeably – when it is needed – depending on the context, to describe the responses people give toward products. When extended, these terms have different meanings due to their intensities and also to the branch of science that researches them e.g. psychology or cognitive science (Ortony and Turner 1990). But they are the members of the same family named 'affective phenomena' and in practice - in daily life - they mostly point to similar meanings and thesis aims to use this practicality.

Vocabulary meanings found in the Scott, Foresman Advanced Dictionary (Thorndike and Barnhart 1993) for '*emotion, affect, sense* and *feeling'*:

Emotion: "A strong feeling of any kind. Joy, grief, fear hate love, anger and excitement are emotions." In the same text, etymologically, the word emotion is described as: middle French emotion < émouvoir (stir up) < Latin emovere < ex (out) + movere (move). This description supports and establishes an informal link to the immediate nature of emotion related to leading an action, which is also accepted by scientists (Roberts 2004).

Affect: "1-(in psychology) the emotional tone of a mental state 2-*emotion, feeling*."

Sense: "*feeling*" In the same text, etymologically, the word 'sense' is derived from Latin sensus < Latin sentire (perceive, know, feel).

Feeling: "1-act or condition of one that feels 2-*sense* of touch 3-*sensation* 4-state of mind in which joy, sorrow, fear, anger or any similar *sensation* is felt; *emotion*."

In the synonym study of Scott, Foresman Advanced Dictionary emotion and feeling are defined as pleasant or painful sensations produced in a person in reaction to a stimulus of some kind. In addition, while feeling is explained being the general word, emotion is differentiated with its strong and *moving* nature.

Vocabulary meanings and synonym study reveal two things: First is the link between action (decision and perception) and emotion. Second is the tendency that these terms are used to describe each other. First finding supports the claim of the thesis that, emotions have an important role in human life such as decision making and well-being. Second finding is the practicality mentioned at the beginning of the section, which this study aims to utilise.

Buchanan claims that it's important to be useful and useable for a product but if a product is not 'desirable' – which is the domain of 'emotion' he states – at the same time, it will not succeed in the market (WEB_1 2006). From Buchanan's view, emotion which, should be more carefully observed in order to understand it in a design context has a double role in a product:

1. Products attract and hold audiences in different ways, and in this lay the importance of emotion as a mode of persuasion. It helps an audience to entertain new possibilities for practical living and to remain open to the technological reasoning and character of a product.
2. The definition of emotion is 'the capability of having a feeling aroused to the point of awareness. That point of awareness becomes a powerful product and leads us to the possibility of making decisions. When emotion is powerfully brought forward and expressed, people gain their dignity and their freedom of action. So I think our exploration of aesthetics and emotion is intimately connected to the ultimate purpose of design, in quite a different direction than the fine art, but ultimately coming home.

By raising awareness through emotion as Buchanan addressed, designers, with the power to influence people's perceptions of the world and themselves within it, can contribute to the quality of life, support issues such as environment and improve global, visual culture, for the same future shared by all the people (Abifares 2003).

2.2. Emotion and its Effect in Human Life

According to a prolonged intellectual tradition that has been priding itself on rational, logical reasoning there has been some false but common prejudgments about emotions (Norman 2004):

- Since emotions belong to our animalistic origins they are out of rationalism and commonsense. Emotions do not have practical outcomes in daily life compared to reason.

- A modern and sophisticated society should disfavor emotions.

Norman states that today's scientific knowledge shows that evolutionary more advanced animals are more emotional than primitive ones and human being is the most emotional of all.

Several researchers believe that there is no typical *pure* decision as well as there is no decision based *purely* on intellectual logic or *purely* on emotion - most decisions are founded on a mixture of both (WEB_2 2006).

The emotional and the rational sides of the brain mostly operate in a high harmony, intertwining their very different ways of knowing to guide through the world (Goleman 1997). Generally there is a balance between emotion and reason: Emotion feeds into and informs the operations of the rational mind, and the rational mind refines and sometimes vetoes the inputs of the emotions.

The essential difference between emotion and reason is the fact that while emotion leads to action reason leads to conclusions and although emotion and reason are intertwined emotion succeeds every time when they are in conflict (Roberts 2004). Without the fleeting and intense stimulus of emotion, rational thought winds down and disintegrates. The role of emotion on decision making is even clearer when a problem occurs in the emotional system of a person. Roberts cites neurologist Donald Cane, who states that if the emotion centers of the brain are damaged in some way, people do not just lose the ability to laugh or cry they also lose the ability to make decisions.

Although those patients appear perfectly normal, function effectively and clearly describe how they should act they cannot determine where to live, what to eat, what to buy and use (Norman 2004). In the light of modern researches, Norman explains the situation: Affective system helps people make quick selections in decision making process. This is a critical assistance reducing the number of things to be considered by grouping them good or bad. Those people can hardly choose among alternatives. And when the alternatives are close to each other in validity the problem reaches to an 'unable-to-decide' point. Choosing the day of an appointment or the dressing of a salad seems quite easy unless the affective system is working properly. It is the affective system that leads sentences like "I have a feeling that I should do this", "I do not know why but I bought it" and "I just felt so" in situations where there is no rational way to decide.

The influence of emotions is not restricted to daily ordinary decisions. Paul Ekman, a professor of psychology, expresses his astonishment at how both scientists

and laymen could not understand emotion's given importance in people's lives until recently (Ekman 2003). After that he draws attention to the power of emotions: Emotions can override what generally considered the more powerful fundamental motives that drive people's lives like sex and will to live: A person may never attempt sexual contact or may never be able to complete a sexual act because of the interference of fear or disgust. A desperate person can commit suicide when negative emotions overwhelm the will to live.

The role of emotion in decision making is closely related to evolution. Emotion with its adaptive ability stated by Darwin plays an important role in survival. Proponents of Darwinian perspective, suggest that emotions evolved to monitor the world for signs of danger to give people advantage during important events without having them think about what to do quickly (Ekman 2003). That is why emotions share a basic duality in which they are either positive and attractive, or negative and repulsive due to the simple feature that they help people choose what should be good for them. Ekman defines emotion as a process, a particular kind of automatic and fast appraisal influenced by evolution and personal past, in which people sense that something important (in a negative or positive way) to their welfare is happening. Otherwise people would not survive dangerous events like near-miss car accidents. Ekman states that if a person had had to think consciously about what he/she should do to cope with an apparent danger there would be a small chance to survive. Thus automatic and permanent nature of emotions, with a great speed, undertakes this task without letting people realize it: Fear and disgust have cautionary functions from threats of harm and toxic activities respectively. Sadness and despair bring help by making others feel pity for. Anger warns people when things are thwarting and motivates them to overcome difficulties.

According to Csikszentmihalyi, a professor of psychology, some emotions are genetically a part of human body and mind (Csikszentmihalyi 1997). Instinctive feelings such as revulsion at the sight of snakes, insects, rotten smell and darkness are accepted as relating to the things that might have presented serious danger to survival in the evolutionary past of human and therefore are worldwide.

Csikszentmihalyi also claims that emotions have a role in determining the actual *quality* of life – what people do and how they feel about it – as well as thoughts by the interpretations given to chemical, biological, and social processes (Csikszentmihalyi 1997). To Csikszentmihalyi, it is probably clear that emotion, intentions and thoughts

do not pass through consciousness as separate subsets of *experience*, but in a constant interconnection, and modifying each other as they process.

In the social well-being side, most researchers who define emotions generally as representing a synthesis of subjective experience, expressive behavior, and neurochemical activity presume that general awareness and the facilitation of social communication are part of the adaptive services of emotions (WEB_3 2006). Orderly continuity of satisfying interpersonal relations seriously depends on fluent bi-directional emotional communication (Shalif 1991).

Experiences of positive emotions broaden people's momentary thought-action repertoires, which in turn serves to build their enduring personal resources, ranging from physical and intellectual resources to social and psychological resources (Fredrickson 2001). Fredrickson proposes that positive emotions both signal flourishing and produce flourishing. Moreover, these positive effects do not simply occur within the present, pleasant moment but over the long-term as well. Positive emotions are worth cultivating, not just as end states in themselves but also as a means to achieve psychological growth and improved well-being over time.

Emotion is effective in social relationships too. People who do not feel emotion are viewed with suspicion (Cornelius 1995). People with higher emotional intelligence are more successful at social relations (Goleman 1997).

Sometimes the interval between stimulus and emotional response is extraordinarily short (Ekman 1999). Ekman states that emotions generally have very fast onsets, beginning so quickly that they can happen before one is aware that they have begun. With this quick onset structure, which is central to the adaptive nature of emotions, people quickly respond to important events. Randolph Cornelius, a psychology professor, cites a recent study by Oatley and Duncan done in 1994 in which subjects were asked to keep a diary of their daily emotional experiences (Cornelius 1995). According to the reports subjects provided, majority of the emotions lasted 5 minutes or longer, with 33% of the emotions lasted 30 minutes and longer.

Daniel Goleman emphasises the power and importance of emotions (Goleman 1997):

> A view of human nature that ignores the power of emotions is shortsighted. The very name Homo sapiens, the thinking species, is misleading in light of the new appreciation and vision of the place of emotions in our lives that science now offers. As we all know from experience, when it comes to

> shaping our decisions and our actions, feeling counts every bit as much – and often more – than thought. We have gone too far in emphasizing the value and import of the purely rational – of what IQ measures – in human life. For better or worse, intelligence can come to nothing when the emotions hold the sway. And it has worked best for the last 50.000 human generations.

Emotion is not a vestigial, needless apparatus that should be removed. Emotions are at the core of life making it livable (Ekman 2003): "Without excitement, sensory pleasure, pride in our achievements, amusement in the many odd and unexpected things that happen in life, would life be worth living?"

The facts and scientific findings intensely presented in this section were briefly aimed to show the indispensable nature of emotion for a person. Emotions affect a person's decisions, social relations, communication and well-being in an incontrovertible way. Since products are objects people choose and experience emotions determine significant parts of that evaluation, choice and experience.

2.3. Products as Emotionally Selected Objects

A major goal for scientific researchers working on emotions is to distinguish and to investigate the subject of '*basic emotions*'. Basic emotions are assumed to be universal, free of culture, gender and species but there is no consensus on this subject either. Table collated by Ortony and Turner (Ortony and Turner 1990) displays basic emotion lists of prominent emotion researchers.

Table 1. A selection of lists of basic emotions

Theorist	**Basic Emotions**
Arnold (1960)	Anger, aversion, courage, dejection, desire, despair, fear, hate, hope, love, sadness
Ekman, Friesen, and Ellsworth (1982)	Anger, disgust, fear, joy, sadness, surprise
Frijda (1986)	Desire, happiness, interest, surprise, wonder, sorrow
Gray (1982)	Rage and terror, anxiety, joy
Izard (1971)	Anger, contempt, disgust, distress, fear, guilt, interest, joy, shame, surprise
James (1884)	Fear, grief, love, rage
McDougall (1926)	Anger, disgust, elation, fear, subjection, tender-emotion, wonder

(cont. on next page)

Table 1. cont.

Mowrer (1960)	Pain, pleasure
Oatley and Johnson-Laird (1987)	Anger, disgust, anxiety, happiness, sadness
Panksepp (1982)	Expectancy, fear, rage, panic
Plutchik (1980)	Acceptance, anger, anticipation, disgust, joy, fear, sadness, surprise
Tomkins (1984)	Anger, interest, contempt, disgust, distress, fear, joy, shame, surprise
Watson (1930)	Fear, love, rage
Weiner and Graham (1984)	Happiness, sadness

Similarly, researches showed that verbal descriptions consumers chose to express the emotions evoked by the aesthetics and perceived attributes of products are subjective; depending on (Ashby and Johnson 2002): The product itself, the context and the culture in which it is used. Those perceptions change with time: A product that appears aggressive or luxurious today can seem humorously retro or just plain ugly tomorrow.

There are many studies and related methods conducted in order to uncover user emotions related to products to reach higher user satisfaction. In one of them, a wide study including design magazines, perceived attributes of products were listed as pairs of opposites (Ashby and Johnson 2002): aggressive-passive, cheap-expensive, classic-trendy, clinical-friendly, clever-silly, common-exclusive, decorated-plain, delicate-rugged, disposable-lasting, dull-sexy, elegant-clumsy, extravagant-restrained, feminine-masculine, formal-informal, hand-made-mass-produced, honest-deceptive, humorous-serious, informal-formal, irritating-loveable, mature-youthful, nostalgic-futuristic. The list has been simplified and reduced in length by replacing near-equivalent words with a single word (e.g. comical, funny to humorous; durable, long-wearing to lasting).

As exemplified above researches about user emotions evoked by products depend on verbal descriptions. The difficulty with the verbal descriptions can be briefly stated as such:

- Sometimes people cannot express correctly what they want.
- Cultural differences may lead ambiguous expressions.
- Lack of proper vocabulary.

Following similar product related emotions, industrial designer Desmet generated an instrument called PrEmo standing for “Product Emotion Measurement Instrument” (WEB_4 2006) to measure emotions evoked by products. Similar to the

basic emotions in the psychology, Desmet suggests that there are 14 emotions often elicited by product design of which seven are pleasant, and seven are unpleasant (see table below).

Table 2. Emotions evoked by products according to Desmet

Pleasant emotions	Unpleasant emotions
Desire	Indignation
Pleasant surprise	Contempt
Inspiration	Disgust
Amusement	Unpleasant surprise
Admiration	Dissatisfaction
Satisfaction	Disappointment
Fascination	Boredom

Instead of verbal expressions, PrEmo uses expressive cartoon animations. Respondents report their emotions by the means of these cartoon animations. Each of the 14 measured emotions is portrayed by an animation through dynamic facial, bodily, and vocal expressions of the cartoon character (Figure 1).

Figure 1. Expressive cartoons used in PrEmo

(Source: WEB_4 2006)

PrEmo is a self-running experimental instrument. Instructions that will guide respondents, including an explanation of the experiment and an exercise, are displayed on a computer screen. Four teen cartoon animations lay on the top section of the interface. There is a hidden three-point scale behind each cartoon. Scales represent the following ratings: “I do feel the emotion,” “to some extent I feel the emotion,” and “I do not feel the emotion expressed by this animation.” Figure 2 shows the PrEmo interface.

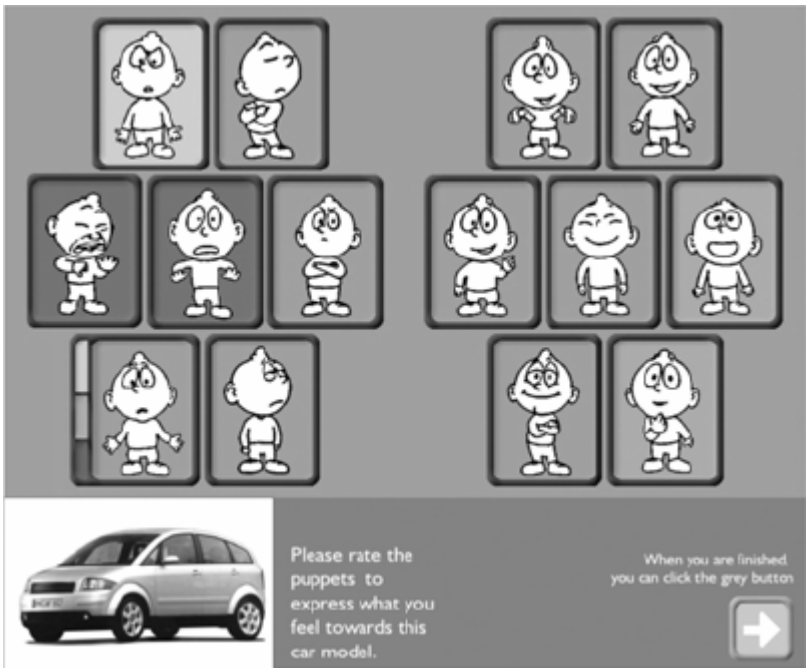


Figure 2. The PrEmo interface

(Source: WEB_4 2006)

With the start of the experiment, a product picture is displayed on the lower left section of the interface to the respondents. Also there is an operation button on the lower right section. These two items direct the respondent to use the animations to report their emotion(s) evoked by the product.

When clicked on the particular still to activate the animation, a hidden scale appears on the left side of the animation frame. Respondents use the three-point scale to scale the product. After that, background color of the animation frame changes to present the visual feedback of the scorings.

Desmet claims that the distinction of PrEmo is the combination of two qualities: Measurement of distinct emotions and cross-cultural usage since it asks respondents to respond with visual items instead of asking to verbalise their emotions. Furthermore, PrEmo can be used to measure mixed emotions when more than one emotion experienced simultaneously by a single product.

2.3.1. Review of the Project

When the project is reviewed it is seen that in addition to the benefits Desmet claims, PrEmo has another yield. PrEmo is eliminating an experiment conductor, a person who is generally assessed by people participating such experiments as a watchman.

Employing an experiment conductor may cause flawed survey results for two reasons. One of the reasons is the possibility of the conductor to lead or direct the participants (Roberts 2004). This is a subconscious tendency resulting from the temporary 'subordinate-superior' nature of the survey.

The other reason is a general tendency of people participating such experiments to assess the conductor as a watchman. Assessment of the conductor's existence in this way generally makes participants feel as if they are being examined. This virtual but effective pressure lead participants, in a subconscious manner, to behave as expected from them to be seen 'normal'. Participants' tendency to draw a 'normal' portrait manipulates their responses and answers in a nonfactual way.

Thus unhealthy and incorrect survey results are collected. By eliminating experiment conductors, PrEmo also eliminates such a virtual pressure and flawed focus group surveys. PrEmo contributes to the collection of more accurate and healthy survey results.

2.4. Traditions in Emotion Research and Related Design Projects

Cornelius lists four main theoretical traditions that have dominated research in emotion (Cornelius 1995): The Darwinian tradition, the Jamesian tradition, the cognitive tradition and the social constructivist tradition.

2.4.1. The Darwinian Tradition

It is considered that the perspective first appeared in Charles Darwin's book, *The Expression of the Emotions in Man and Animals* published in 1872. Darwinian tradition indicates that emotions evolved to help human understand and adapt to the environment in order to survive. Darwin proposed that emotions evolved via natural expression, thus

have cross-culturally universal counterparts. Physical displays of emotion including body language of animals and facial expressions in humans are the focus of the tradition.

A design project directly related to Darwinian tradition of emotion research could not be found.

2.4.2. The Jamesian Tradition and Learning to Talk with Your Body Project

Bodily changes were the basis of William James' theory, which started to form in the 1800s. According to the James, these bodily changes (internal physiological reactions) such as visceral, postural, or facial were responsible for the emotional experience. "According to James, if we see a bear we run and *then* we are frightened. Perception, according to James, causes bodily reactions that are then experienced as emotions. In other words, the emotions we feel depend on what we *do*" (Hergenhahn 2000).

James' theory and his assertion that an efficient means for interpreting a person's emotion is by imitating that person's emotional expression led an experimental case study: 'Learning to Talk with Your Body' (Weerdesteijn et al. 2005). The base of the design project was the assumption of James that dynamic bodily expressions are not only the results of emotions but also stimulus for emotional experience.

2.4.2.1. The Aim of the Project

The study was set to explore the possibility of using expressive movement for creating educational products that express emotions rather than evoke them (Weerdesteijn et al. 2005). Study team followed the results of Strack, Stepper and Martin of year 1998, claiming that an emotional expression can actually infer a particular feeling: smiling in a sad mood can make a person feel better.

The goal was to design educational products that can be used to teach children, aged between four and six – totally thirty-three – how to emotionally express themselves with their bodies. Designers' aim was to develop objects expressing the given emotions both in their static appearances and dynamic (interactive) movements.

Since products really move people, and the quality or character of this movement is partly defined by the product's design, designed objects were conceived as facilitators for the development of the skill to express emotions in dynamic social interaction by exemplifying emotional expressions and initiate active exploration of these expressions in children.

Selected emotions were both distinct (anger, fear, sadness, joy, pleasant surprise and attraction) and comprise of a cross section of the common emotions a small child probably experiences daily.

2.4.2.2. Design Criteria and Design Process

Objects were to be one third of a child's height to ensure that the objects were inviting and stimulate explorative interaction (Weerdesteijn et al. 2005). Objects would only show their full expression during direct manipulation, thus stimulating the children to move with the objects. Since objects were not designed to evoke the particular emotion, but merely to express it, teacher and the children had the opportunity to decide to what extent they want to explore the each emotion. Objects would have both human and non-human elements. Human element was conceived to direct children to identify the object as an emotional being. Non-human element was conceived to allow children to project their own body diagram onto the object.

Designers described the six emotions with single key sentences to facilitate the design (e.g. shape, color, material, texture) by means of verbal expression and researches done on dynamic bodily expressions (Laban 1948, Meijer 1989, Wallbott and Scherer 1986, Wallbott 1998, Quilliam 1994): "Sadness is indifferent to manipulation", "Anger stings when manipulated", "Fear trembles when manipulated", "Joy swings when manipulated", "Pleasant surprise startles when manipulated", "Attraction comes nearer when manipulated" (Figure 3).

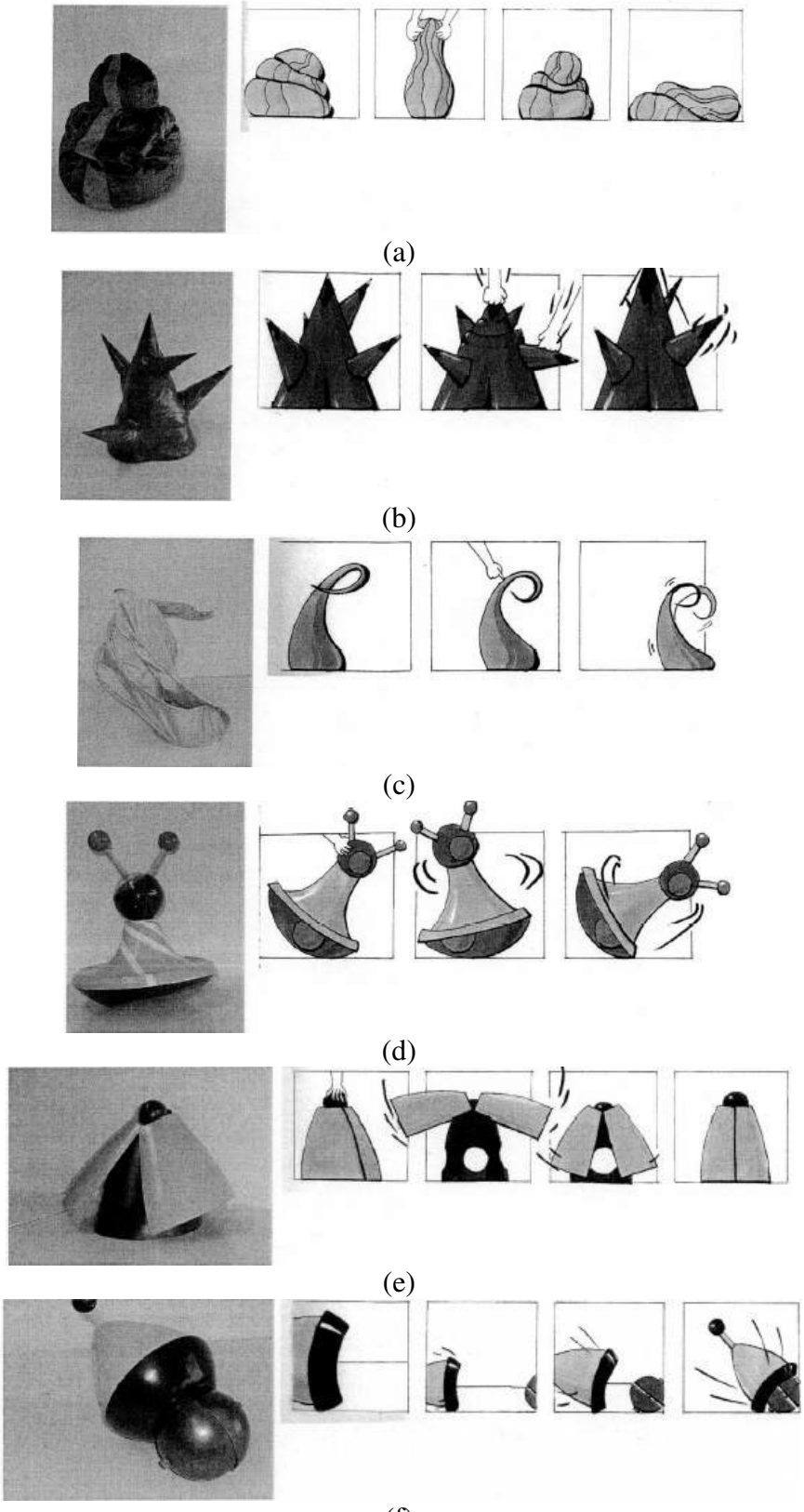


Figure 3. Verbal expressions used to describe design objects (a) Sadness is indifferent to manipulation (b) Anger stings when manipulated (c) Fear trembles when manipulated (d) Joy swings when manipulated (e) Pleasant surprise startles when manipulated (f) Attraction comes nearer when manipulated

(Source: Weerdesteijn et al. 2005)

Focus was given to human bodily and dynamic emotional expressions rather than facial and static ones. Characteristics of the movements were portrayed and used to build analogies for design process (Weerdesteijn et al. 2005):

When expressing sadness, the body or the parts of it close and relax looking as though it has folded up. The movements are forceless, generated on relatively large amount of time. The movements are slow, legato and directed downwards, as though the individual is retreating from the room. A limp rag or a mop could be associated with sadness, because they do not have a definite shape, have trouble standing up, hang and fall when released. Blue, white and lilac are the associated colors whereas associated materials are soft, cold, weak, and fragile for example velvet.

Anger causes a lot tension in the body, often looking for a way out. The whole body or part of it tenses and opens up to its maximum extent while the movements are staccato, fast, forceful, and often explosive. Movements become larger and larger and relatively the use of space becomes more expansive and upward. Anger can be associated with explosives and intense, sharp, sudden movements. Associated colors are bright and contrasting, such as red green and purple. Artificial, hard, cold and shiny materials are associated with anger, like fake leather.

Subsequently, Sadness object resembles a person with his head in his arms from rear view. Anger's two legs stand firmly on the ground. Joy hardly touches the floor. Anger tends to move upwards, Sadness downward. And Joy is undirected.

2.4.2.3. Evaluation of the Design and the Results

When the study was evaluated, it was seen that children recognised Sadness and Anger unambiguously clearly. The objects, Joy, Pleasant Surprise and Attraction were recognised to some degree while Fear was found to be unclear.

In addition whether children have the ability to translate the objects' expressions to their own bodily expressions were explored (Weerdesteijn et al. 2005):

Sadness has the impression of a head and a body with no limbs. Light blue stripes of the deep blue velvet refer to tears. Sadness cannot stand upright adversely withdraws in itself, and lets its head hang down. When the head moves a sniffing-like sound is heard.

Anger stands firmly on the ground looking like it could sting you. The bright red fake leather with snake print makes it animalistic and dangerous. The clashing, bright purple, poisonous looking points give an aggressive appearance to Anger and the asymmetry makes it unreliable. It immediately reacts upon act. Anger can react toward sides because of the foam inside.

Fear tries to turn away from the stimulus. It seems to roll up, making itself as small as possible. Its cool ice blue appearance makes it look tough but it is soft (vulnerable), especially on the inside. When touched, trembles with tension.

Joy hardly touches the floor. Its cheerful appearance with its arms up in the air is combined with bright yellow, orange and blue. When pushed, Joy rotates, swings and moves a lot, but always end straight up. Joy surprises with its unexpected moves due to the orange weights at the bottom.

Pleasant Surprise leans back slightly with an undisturbed awaiting appearance, which is strengthened by the green color. When Pleasant Surprise's head is suddenly pushed, it quickly pulls up its shoulders and opens its arms in surprise. Then a deep, somewhat alarmed, bright red underneath the calm green shield is seen. After the pressure on the head is stopped, it slowly relaxes, closing the shield.

Attraction is composed of a blue metallic ball, and a pink-deep red part that is attracted to it. Pink part's shape reveals that it is focused on the ball, and when its tail is released Attraction moves towards the ball in a straight line, first slowly, then faster as it gets closer to the ball. Once Attraction attaches itself to the ball, the two parts seem as one.

Social Responses created include (Weerdesteijn et al. 2005):

Children did not only express the emotions that are exemplified by the objects, but also responded to these emotions. Children's responses to Anger were angrily. While manipulating the object, their movements almost immediately became large, forceful and quick, similar to Anger itself. Their faces frowned and looked menacing, like people in a fight.

Sadness caused the children's movements to get small, gentle and soft like Sadness itself. But children started to move quicker and more forceful by time. At first, they treated Sadness softly and tenderly as if to comfort the object, and the faces also showed sadness to empathize with the object. However when they realized that the stimulus continued to be sad (no respond to their efforts of comforting), the children became annoyed with the lack of response. So whereas the initial response to Sadness

was a compassionate sadness, this feeling gradually turned into agitation because of the lack of a positive response. This illustrated that the children did not only imitate the objects, but also displayed emotionally expressive interaction with the objects.

Teacher of the children found objects' dynamic nature essential for making the emotional expressions tangible and obvious. These dynamics also created a playful atmosphere, which is required to stimulate the children to explore their own personal physical expressions. The children moved in ways in which she had not seen them move before. Children were reported being very curious, focused and participative during the study. The act of moving itself often evoked the emotion joy (regardless of the identity of the involved emotion), for example, the angry angular movements and menacing faces gave way to a lot of laughing while interacting with Anger. The experience and lessons were remembered strongly and positively even after two weeks. The children could recount a lot of details of the various stimuli. Some even managed to accurately draw one or more of the stimuli from the memory.

The objects managed to invite and stimulate children to physically explore emotional expressions and had a substantial impact on their expressive abilities. Children not only explored the emotions but also experienced emotions to a certain degree.

2.4.2.4. Review of the Project

When the project is reviewed, it is seen that movements itself could indeed motivate people emotionally as claimed by Jamesian tradition of emotion research.

Project indicated that the appearance of a product implicitly creates an expectation of the way it should be moved to use and to operate and also what character or quality of this movement will be. Thus, from a designer perspective, this study exemplified that deliberate emotions can be designed into products. With a proper expectation-form relation, emotions designed into product form could facilitate use by directing users through the impressions design generates on users.

Different than general object design projects, focus had been given to dynamic qualities of the design rather than the static ones. Form of the objects was expected to allow a dynamic interaction with the users in a humanlike frame. Moving from this point, designers made close observations on human bodily and dynamic emotional expressions in order to mimic them through design. This brought a use of color and

materials as significantly as form itself: The use of bright and contrasting colors such as red green and purple; artificial, hard, cold and shiny materials like fake leather in the design of Anger.

Project indicated that for a successful emotional design, a detailed observation of the subject especially from a communication and interaction perspective is a must. A point worth to emphasise is the advantage of using simple inferences reflecting daily associations users are familiar with. Like the key sentences generated to facilitate the design: "Sadness is indifferent to manipulation".

'Learning to Talk with Your Body' project is an example of emotional attributes utilised for educational purposes. The study showed that emotions can serve as effectively as the traditional ways of communication employed in education like verbal and written communication of knowledge. Emotionally designed education instruments could be substitutes of traditional methods in order to experience new perspectives in education activities. Moreover this approach is open to expand and be applied in different areas for the educational and adaptational studies of the disabled or special people like the autistic.

2.4.3. The Cognitive Tradition and the Emotionally Intelligent Alarm Clock Project

The cognitive approach for the study of emotions started with the work of Magda B. Arnold in 1960. In this approach, the central assumption is that thought and emotions are inseparable. More specifically, within this perspective, emotions are seen as being dependent on appraisal, the process by which events in the environment are judged as good or bad for a person.

Proponents of cognitive tradition believe that thought and in particular cognitive appraisal of the environment is an underlying causal explanation for emotional processes. Cognitive psychologists have emphasized the role of comparison, matching, appraisal, memory, and attribution in the generation of emotions.

In design sphere, the field of usability had a tradition of interest in *measurable* and *observable* cognitive activity to reach ease of use and functionality. However in the last decades, the usability and design community begun to pay closer attention to the aesthetics or affective aspects of interaction design in the usability evaluation process (WEB_5 2006).

These works advocated a broader focus on pleasure and emotion within usability and design of a product's user experience. There are two reasons: First one is the recent change in which emotion and 'pleasure engineering' are beginning to occupy a critical role in product design as usability becomes more of a competitive differentiator in new device design – especially for mobile handsets and communication devices. Second one is the studies showing that attractive interfaces with high aesthetic qualities arousing attention are easier to learn, work better and produce more harmonious results.

Wensveen et al., in year 2000, started to design an emotionally intelligent alarm clock, which elicits expressive behavior and demonstrated that the design was able to understand the mood of the user from the way he/she sets the alarm (Wensveen et al. 2002). The aim was to improve user product interaction through emotion recognition.

Wensveen et al. took the role of emotions in relationships as the model for the project's perspective. Success in relationships highly depends on the skill of managing emotions in others that emotional intelligence is a master aptitude, a capacity that profoundly affects all other abilities either facilitating or interfering with them (Goleman 1997). These emotional abilities relate to social competence/incompetence and support popularity, leadership, and interpersonal effectiveness.

2.4.3.1. The Aim of the Project

To designers' viewpoint, many alarm clocks used to wake people in the same way regardless of the situation (Wensveen et al. 2002). Contrarily, the project headed for an alarm clock that will be capable of pampering the user on a Sunday morning or insisting on getting the user out of bed for an appointment should not be missed. To attain this, an alarm clock has to invite user to interact, recognise user's emotion and adapt to them.

Emotions are essential elements of communication between people and people express emotion through behavior. Emotions are also expressed in human-product communication, e.g., by shouting at the monitor, shoving a chair away, or hitting a malfunctioning printer. While this type of behavior does not enhance communication between user and product, it depicts a lack of communication. Designers claim that if the 'body' of the product could express that it can recognise a person's emotions there will be a proper communication between user and the product (Wensveen et al. 2002).

2.4.3.2. Design Criteria and Design Process

An approach to solve this problem related to the form of the product is to add anthropomorphic qualities to a design. Anthropomorphism is the attribution of human form or other human characteristics to any nonhuman object as possessing qualities of thought, will, or emotion that are continuous with those experienced by humans (WEB_6 2006). The negative emotional responses towards products mentioned above are subsequent negative acts of this tendency. When people attribute human characteristics to any nonhuman object they seek for a rewarding communication. They expect the artifact to understand them and respond properly. If a person perceives an artifact anthropomorphically he/she tends to think a malfunctioning object is acting against him/her. Such a tendency generally ends with an angry act towards the product.

This is anthropomorphic distraction and risky for a design process. Anthropomorphic distraction is elicitation of expectations from products that cannot be met when they are designed more anthropomorphic than they should be. Such situations lead misunderstandings and frustration when products pretend to have the same abilities as humans when they clearly don't (Wensveen et al. 2002).

Wensveen et al. suggests that solution is not to make the 'body' more anthropomorphic. Designers claim that making a product even more anthropomorphic when people already attribute humanlike characteristics to non-humanlike products would cause anthropomorphic distraction as stated in the preceding paragraph. Instead, they employed a design-driven approach taking the 'interaction with the product' as the starting point for the detection of emotion. The approach anticipates that the product senses user emotions from the way he/she uses the product while the user interacts with the product to communicate 'factual' (setting the alarm) information.

This approach determines some conditions for the product:

1. Elicit rich emotional behavior while the user communicates 'factual' information: Expressing emotions presupposes freedom of expression, and thus freedom in interaction. Alarm clock invites the user to express himself/herself by offering a myriad of ways of setting the "factual" information, i.e., the wake up time. People can choose to set it by displacing as many sliders as they like (Figure 4 b) or by sliding one slider at a time (Figure 4 c/d). This behavioral freedom provides emotions to influence

the behavior. This freedom is further enhanced by the fact that sliders can go back and forth and actions are easily reversed.

2. Have the ability to recognise this emotional behavior: This is what the project really aims and thus will be explained in the following paragraphs.

3. Reflect and understand the expressed emotion. Third condition is divided in two: Condition 3a: Reflecting the expressed emotion: The basic assumption of this research is that different emotions leave different behavioral traces like the difference between a joyful moment and a sorrowful one. Setting the time in a different mood leaves a different trace on the alarm clock. Here mood is defined as a temporary state of mind, which can be positive or negative (valence) and calm or excited (arousal). Whereas the central display shows the wake up time (factual information), the successive patterns of the sliders reflect the influence of the emotion on the behavior that led to this wake up time. This is the inherent feedback. It is information provided as a natural consequence of making an action. It arises from the movement itself. Condition 3b: Understanding the expressed emotion: The next morning the alarm wakes the user with a sound. The choice of this sound makes clear that it understood you.

Since the designers believed that design should start from the human experience because people experience the world with all their senses and all their skills, a probe was set to observe the emotional experience of waking up of a group (Wensveen and Overbeeke 2001).

Group was given colored pens, question cards, a diary, an audio recorder and a disposable camera. The central task was a small diary in which the participants are asked to monitor their day during a week – what time they got up, what their plans are for the rest of the day and how their day has been. Facial expression images were to be marked with differently colored pens to indicate how they felt. The purpose was to find correlations on arousal and valence between the time-related aspects of sleeping and waking up and the emotional experience of persons through the categorisation of the facial expressions.

Another task was to make a family tree in order to investigate the desirable personality of future intelligent alarm clocks. The participants were asked to imagine their current and ideal alarm clock with provided portraits, which they can stick on a family tree postcard.

One participant depicted the personality of the current alarm as being a mix of Stalin ("alarm as a dictator") and a TV news anchorman ("...a bit boring, but reliable").

And the desired personality was a mix of the Dalai Lama ("waking up in a peaceful, tranquil way") and the sun ("...a natural, gradual way of waking up").

Another task needed the use of a disposable photographic camera and an audio recorder. The participants were asked to explore and capture their experience of waking up by making pictures and recording sounds: sounds and images of themselves, their alarm clock, their bedroom, something pleasant, something irritating, something relaxing or beautiful. Furthermore the group was asked to record sounds and images with which they want to wake up. The probes helped designers empathise with each person and gave a useful feeling of the context in which they wake up. Probes also showed the time-related aspects of sleeping and waking up, the degree of urgency of getting up and a person's current mood as important parameters for the expected emotional experience in the morning.

Prototype consists of two displays – front display showing the current time, central display showing the alarm time – and twelve sliders. When the sliders are slid from the starting situation (a) towards the central display the alarm time appears in central display (b). With the first displacement of a slider, time is added to the current time to make up the alarm time. With each successive displacement, more time is added to (c: moving towards the center) or subtracted from (d: moving towards the edge) the alarm time. Each slider ranges from 0 to 60 minutes. Upon reaching the preferred wake up time the central display is pressed and the alarm is set (e) (Figure 4).

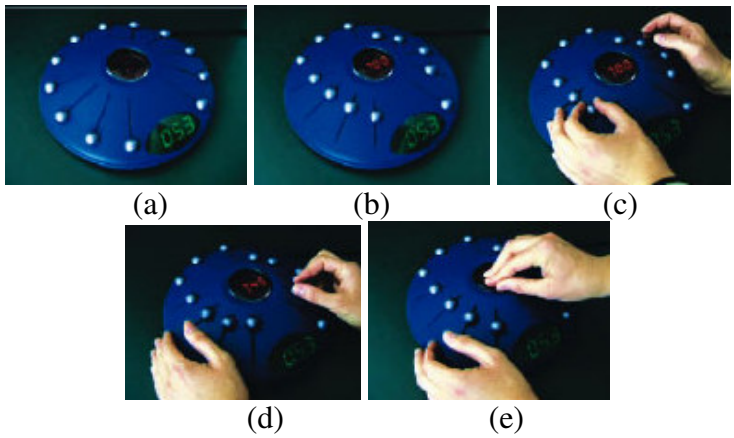


Figure 4. Operation process of emotionally intelligent alarm clock (a) Slide sliders from the starting situation (b) The alarm time appears in central display (c) Moving sliders towards the center adds more time to alarm (d) Moving sliders towards the edge subtracts time from alarm (e) Central display is pressed to set alarm

(Source: Wensveen et al. 2002)

Wake-up time (factual information) is set differently due to the way the user moves the sliders (mood information). Based on both factual and mood information, the alarm clock decides for an alarm sound. Next morning, user wakes up to this sound and silences it by gently touching or hitting the snooze button. This behavior expresses the person's emotions about the appropriateness of the decision. From this behavior the system gets feedback on its decisions and can learn and adapt accordingly.

2.4.3.3. Evaluation of the Design and the Results

The results illustrate the importance of a tight coupling between action and appearance in interaction design, through freedom of interaction and matching inherent feedback.

2.4.3.3.1. Invitation Ability

The freedom of interaction (possibilities of diversification) stated before was realized as offering the user a myriad ways to set the wake-up time, instead of a fixed sequential procedure. Figure 5 demonstrates a sampling of the many ways to set the alarm clock to 6:00 o'clock (Wensveen et al. 2004).

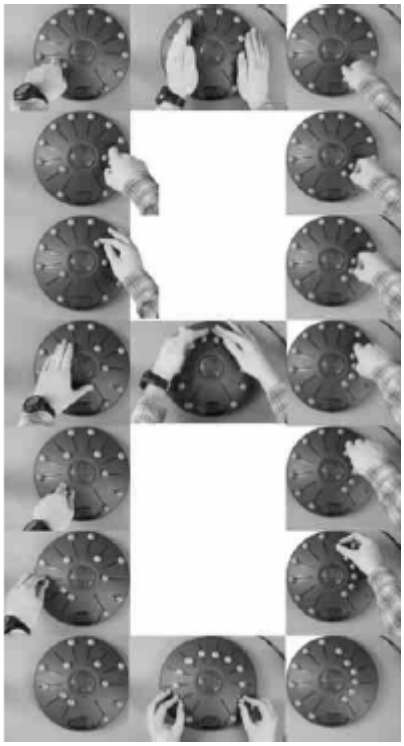


Figure 5. A sampling of the many ways to set the alarm clock to 06:00 o'clock

(Source: Wensveen et al. 2004)

The top sequence (top to bottom) of the figure is an expression of irritation through swift actions resulting in an asymmetrical and chaotic pattern whereas the bottom sequence is done in a relaxed state with symmetrical actions.

An important part of the expression is realizing the effects of emotionally expressive actions, which allows the user to value and appreciate what he/she has done. Besides possibilities of diversification, the experience becomes even more engaging if the result reflects the expressive action. Setting the alarm is not only about the fact that it will be set to 06:30 o'clock; it is also about how the user set it to 06:30 o'clock and about how the setting expresses user's mood and a sense of urgency. Thus the slider pattern of the alarm clock not only informs user about the alarm time, it also reflects the emotional expression of the action. When the slider pattern is coupled to the alarm sound, it offers information about the functional mode of the product. Slider pattern and alarm sound allow for so many variations, which designers suggest causing an ambiguity in the relation between the two. This ambiguity can invoke curiosity and stimulate exploration, keeping the interaction engaging and fun.

The action parameters describe how the participants actually move the sliders. The pattern parameters describe the result of the action. So, over the actions (i.e., an uninterrupted displacement of one slider) a history of the interaction reflected in the successive patterns was built up.

2.4.3.3.2. Emotion Recognition Ability

In order to test the ability of the alarm clock to recognise emotion, an experiment consisting of the following steps was carried out (Wensveen et al. 2002):

1. Validation of film clips to induce mood (valence and arousal) and urgency:

A Mood Induction Procedure (MIP) developed by Westermann, Spies, Stahl and Hesse in 1996 was used to control user mood. To induce both positive and negative mood states, an MIP utilised with film clips was chosen.

The first aim is to find film clips that target the dimensional quadrants of the circumplex model organizing emotions in a two-dimensional valence/arousal space. Designers employ the statements of Larsen and Diener that the circumplex model of emotion suggesting a clear structure for the effects emotion will have on behavior with a large heuristic value. Similarly, a circumplex model of emotion, by accounting for majorities of the variance in affect measures, suggests a simple yet powerful way to organise facts about emotion.

The second aim of Step 1 is to find the individual values for valence, arousal and urgency as attributed by each participant. These scores are needed in Step 4 in order to be able to correlate an individual's mood with his or her setting behavior. Therefore the results of the 13 participants of the actual experiment are reported here (Step 2).

Clips were chosen on the suggestions of film experts targeting the dimensional quadrants of the circumplex model:

High arousal and positive valence: A clip from the cinema film Blues Brothers.

High arousal and negative valence: Film clips taken from the documentary film Koyaanisqatsi.

Low arousal and negative valence: A black and white clip from the cinema film Stalker.

Low arousal and positive valence: A scene from the cinema film Easy Rider.

After each film session, participants filled in an evaluation form consisted of two questions relating to the arousal and the valence of their mood using the 'Self Assessment Model' (SAM) of Lang developed in 1985.

To induce urgency, each clip was preceded with a text in the form of a 30-second motion graphic. This read either an urgent message: "Tomorrow you have to go to the airport. Catch a plane. You cannot oversleep! You have to get up at eight o'clock. 8:00" or a non-urgent message: "Tomorrow… no obligations. A day off. You still want to do something nice. Set your alarm around… 8 o'clock." The messages were also superimposed during the last 30 seconds of each film clip. The urgency was also evaluated.

2. Induction of a mood and urgency while participants set the alarm clock:

This step aimed to have the participants set the alarm clock while being influenced by different film clips. For stimuli, film clips of step 1 were used to induce mood and urgency. Afterwards participants were asked to set the alarm eight o'clock.

To be able to measure the setting behavior the alarm clock produced electronic read-outs from each slider. These readouts are the identifications of a slider: the starting time of a slider action, the duration of the action, the value in minutes ranging between 0 and 60 at the start of this action and the value at the end of that action. One action is defined here as the uninterrupted displacement of one slider.

3. Measuring the behavior of participants using behavioral parameters:

To be able to categorise the user behavior two groups of parameters were defined: The parameters that define the action itself (Duration, Waiting, Speed and Sliders) and those that define the end result of an action, the slider pattern (Displace), which were computed from the electronic readouts of each slider.

Displace is the value of displacement of each slider.

Duration is the time a slider slides during one action.

Waiting is the amount of waiting time during which none of the sliders is touched after one action.

Speed is the average speed of a slider during one action.

Sliders is the number of simultaneously used sliders during one action, calculated for every action.

The parameters that define the slider pattern are illustrated in Figure 6.

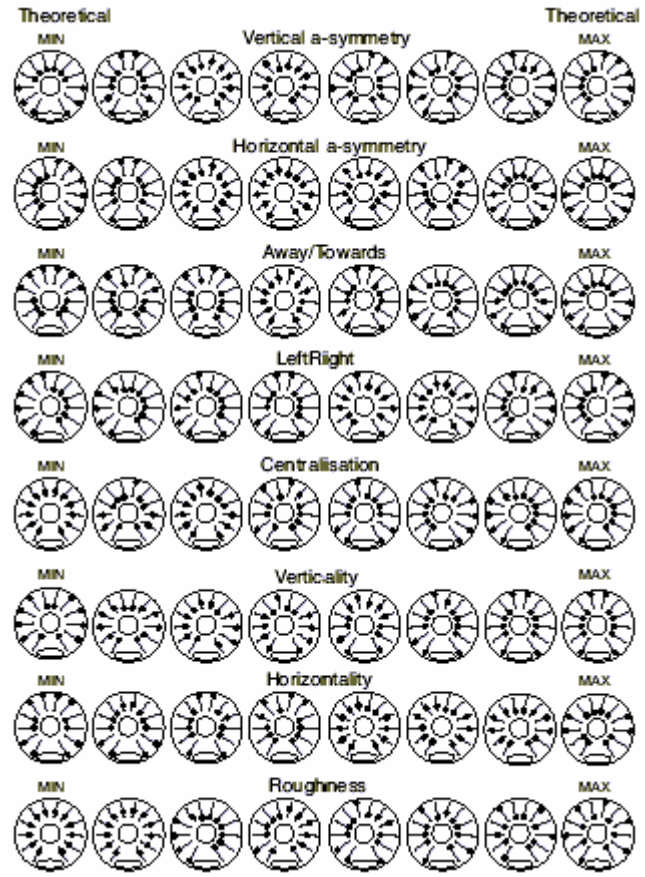


Figure 6. A Visual description of the pattern parameters

(Source: Wensveen et al. 2002)

4. Calculation of equations for mood and urgency from these parameters: Equations to calculate values for valence, arousal and urgency from the parameters, were built in order to use in the fifth step.

5. Identification of the mood by comparing the calculated values of Step 4 with the validation values of Step1:

Due to the results using the equations built in step 4: The success rate for the correct identification of arousal ranged between 50% and 100%, with a mean of 86% over all participants. For valence this rate ranged between 62.5% and 100% with a mean of 82%. The success rate for urgency ranged between 75 and 100% with a mean of 87% correct predictions. The success rate for the prediction of the total situation ranged between 37.5% and 87.5%. 58.7% of all situations was calculated correctly.

Results indicated that when people have been induced by a more positive situation, they ‘show’ more actions per setting, more centrally balanced patterns, more

horizontally symmetrical patterns, more vertically symmetrical patterns, slower actions, shorter displacements and shorter waiting time between actions.

When participants are more aroused, they 'show' more sliding actions towards them, less vertically symmetrical patterns, less horizontally shaped patterns and faster actions. When participants feel more urgency in a situation, they 'show' smoother patterns, less vertically symmetrical patterns, more centrally balanced patterns, more sliding actions towards them, faster actions and shorter actions.

Thus the design of the alarm clock illustrates the importance of a tight coupling between action and appearance in interaction design. It distinguishes itself from current electronic products through traces and inherent feedback. In current electronic products, only the final setting of the controls is taken into account. In this alarm clock, the intermediate stages are also considered, that is, the history of the final setting is also used to determine the user's needs. Inherent feedback means the feedback through the appearance of the product as a natural consequence of the user's actions. Because of the inherent feedback the traces become visible, are made explicit for the user and guide his behavior. For example, using both hands on the sliders in an even and balanced way creates a symmetrical and smooth pattern. Then the appearance of this pattern will push the user to either heighten the symmetry and smoothness or disrupt them depending on how he/she feels. This is a depiction of synergy the traces and inherent feedback carry. Without inherent feedback using traces is meaningless, as the product cannot guide the user's behavior: the trace is invisible and cannot invite the user to act in an emotionally rich manner.

2.4.3.3.3. Adaptation Ability

Under this title adaptation is considered as the ability of a product to adapt itself to the user. While interacting with a product to put factual information into the system, people also express their emotions to the product (Wensveen and Overbeeke 2001). The goal is to design products eliciting expressive actions and that can communicate understanding of these actions to the user through inextricably linked feedback.

The alarm clock is designed to decide for an appropriate alarm sound based on the information below:

- Amount of sleep the user will have calculated by subtracting the alarm-set time from the wake up time.

- The way the user expresses how he/she feels about getting up (urgency and mood).
- The duration the user takes to complete the task of setting the alarm time, the kind and the intensity of the actions and the distribution of the actions over time.

The next morning the clock produces the chosen sound. After the user touches the snooze button the system will choose a new alarm sound based on the information below:

- Amount of the duration between touching the snooze button and releasing it.
- Behavioral parameters of pressing the snooze button: *A categorisation of sleepiness* and *appropriateness* of the sound is made.

The user can repeat the sequence of pushing the snooze button until he/she decides to turn the alarm off.

2.4.3.4. Review of the Project

Like 'Learning to Talk with Your Body' project, 'Emotional Alarm Clock' project proved that products could be designed to affect daily experiences significantly and this opportunity can be used to enhance user product interaction. An enhanced user product interaction will then lead an enriched life.

'Emotional Alarm Clock' took a step further and showed that, in addition to evoking predetermined emotions, products can be designed to recognise, respond and adapt to complex emotional experiences and preferences of user. In this case, it was the waking experience of the users.

Attribution of human form or other human characteristics (anthropomorphic qualities) to a product is not the only method to design a humane object. On the other hand improper or excess use of anthropomorphic qualities causes anthropomorphic distraction that lead frustration and violence when products malfunction. Instead, designers chose a design-driven approach taking the 'interaction with the product' as the starting point for the detection of emotion. The approach anticipates that the product senses user emotions from the way he/she uses the product while the user interacts with the product to communicate 'factual' (setting the alarm) information.

There is a need for detailed and skilled observations (probes) about daily routines of people in order to understand their emotional experiences to design

emotionally successful products in return. In the observation phase, letting users express themselves in informal but intuitive ways like a diary, an audio recorder, a disposable camera and a family tree (to investigate the desired personality of future intelligent alarm clocks by the means of photographs) gave designers the opportunity to empathy with the users.

Emotional attributes are useful to invite users interact with the product again and again causing a long-term use. In this case, this goal has been reached through pleasure of playing with sliders and related alarm sound of next morning. Preventing product boredom will decrease consumption depending on obsoleteness created by advertising and trends in order to increase the purchase. Major consequences of decrease in consumption will be a decrease in exploitation of natural resources and re-adjustment of spare financial resources of industry and household to other subjects like social and educational issues.

Since each emotional experience is different patterns of the sliders will vary according to the mood of the user at that instant. Patterns of the sliders will reflect the influence of the emotion on the behavior that led to this wake up time. Then the user will have an opportunity to reflect on his/her emotional state. Such a way of reminding emotions may lead the awareness Buchanan stated in the beginning of this chapter.

Lastly 'Emotional Alarm Clock' project is a successful example of bringing user and technology together. The high technology used to recognise and adapt to the user emotions has been concealed behind the use of sliders – a simple, basic and easy to use operating structure.

2.4.4. The Social Constructivist Tradition

Social constructivists claim that emotions are cultural products that owe their meaning and coherence to learned social rules (Cornelius 1995).

Social constructivists stress the importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding. Many of the current research in emotion are based on the social constructivist view.

A design project directly related to social constructivist tradition of emotion research could not be found.

CHAPTER 3

PRODUCTS AND PRODUCT AESTHETICS FROM AN EMOTIONAL PERSPECTIVE

A product is not just a materialistic help, fulfilling its primary tasks such as functioning or facilitating (Jacobs 1999). Jacobs argues that a product also fulfills what he calls secondary tasks: *emotions*. Emotions a product evokes are not only confined to the form, but has a relation to a whole set of properties including smell and sound as well. When all these aspects do not match the product evokes negative emotions.

3.1. A World of Products

Before starting to observe the emotional relations between people and products, an observation on the relation between the affluence of artifacts (including products) and emotions is valuable.

Industrialised societies are structures where the relevant material needs are fulfilled by the production of objects (Alessi 1998). Design seems to be an integrated part of our everyday life from objects used to the clothes worn; even many of the things people eat are designed (Forty 1995). It is obvious that people are surrounded by products.

If each product is counted as a different species, the number of the products excesses the number of the organic species – between 1970 and 1988 more than 4.7 million patents have been approved only in USA – (Basalla 2000) and according to Basalla, 'world of products' is the immense universe of objects utilised by humans to cope with the material world, to facilitate the social relations, to satisfy the imagination and to create meaningful symbols.

Baudrillard depicts this luxuriant, continual and mutational growth of objects as a flora or a fauna, complete with tropical and glacial species, where sudden mutations and varieties are under the threat of extinction (Baudrillard 1996) that can be named as market failure from the perspective of the thesis. For Baudrillard, these generations of products, appliances and gadgets that urban civilization witnesses are the signs of the

human as a remarkably stable species on the world. To show the extend products reach, Baudrillard gives some examples of classification criteria for products:

- The size of the object,
- Its degree of functionality (i.e. the object's relationship to its own objective function),
- The gestures associated with it (are they rich or impoverished? traditional or not?),
- Its form,
- Its duration,
- The time of the day at which it appears (more or less intermittent presence, and how conscious one is of it),
- The material that it transforms (obvious in the case of a coffee grinder, less so in those of a mirror, a radio, or a car – though every object transforms something),
- The degree of exclusiveness or sociability attendant upon its use (is it for private, family, public or general use?)

When Baudrillard's classification is observed from an emotional perspective it is seen that items can be divided into two groups according to how they relate to emotions. Form and size generate the first impression of a product in the consumer's mind related to his/her aesthetics values. Gestures associated with a product, time of the day at which a product appears, material that a product transforms and the degree of exclusiveness or sociability attendant upon its use are related to the emotional experience of a user with a product.

Despite a generalization bringing function and material needs to front, Basalla suggests that biological requirements cannot be the core reason to spend so much thought and effort for new products. The need for new artifacts arise from human being's choice to define and carry on her/his life in such a special way: Artifacts are not the breed of human reason and requirement but of human desire (Basalla 2000).

At the present day, increase of products with an ever-rising acceleration can be interpreted in a sense of capitalist industry, consumption society and power of advertising. Affluence of artifacts produced before industrial revolution opposites this argument. In the history of the ceramics, there have been an endless variety of designs for cups. If only function was the vital part of the design (drinking from) there would be

only one design of cup; besides being articles of commerce, cups serve to create wealth and to satisfy consumers' *craving* to express their sense of individuality (Forty 1995).

Basalla does not agree with the definition of 'history of technology' as the record of the products that help people survive. On the contrary, he claims, it is the proof of the prolificacy of creative mind and the different manners of life people have chosen (Basalla 2000). In this context, Basalla takes the multiplicity of artifacts as one of the highest forms of expression of human existence.

Figure 7 below shows different interpretations of the function of music listening in recent times expressed by various MP3 players.

Figure 7. A collection of various MP3 players

(Source: Kesteren et al. 2005)

If the only drive for design and production of the artifacts was pure functional requirements then there would not be such variations in product categories as exemplified with the MP3 players shown above. Such a variation of products having the same function is a part of consumption culture but that is not the only reason. People demand these variations to satisfy their emotional needs such as self-expression, imagination, self image, popularity and attractiveness.

In addition to the relation between production-design and emotions, market researches point that consumers who make decisions based purely on facts represent a very small minority (Roberts 2004). Majority of the consumers, decide with their mind and their emotions. The rational side is based on *reason*: what is the function of the product and how does it perform. Thereafter consumers make an emotional *decision*: "I like it", "I prefer it", and "I feel good about it". Researchers conclude that this is a very subtle mechanism because people feel before understanding. That means people can usually sense what something is before seeing it in detail. Here the key factor is making people feel good about a product and getting a positive emotion to make difference.

In a world of products with a social structure associated with technical development, Baudrillard addresses the need for answers to questions such as how objects are experienced, what needs other than functional ones they answer, what mental structures are interwoven with (and contradict) their functional structures, or what cultural, infra-cultural or trans-cultural system underpins their directly experienced everydayness (Baudrillard 1996). Thereafter he emphasises the consideration of the processes people relate to products and the systems of human behavior and relationships that result therefrom instead of products' functions or the categories into which they might be subdivided for analytical purposes.

Parallel to Baudrillard, Margolin criticises the short of research on products-user relation (Margolin 2002), which he states 'severely': "We need more data on the personal and social consequences of product development. Compared with the research on the environment, violence, sexuality, and a myriad of other subjects, research on product use is virtually nonexistent."

Buchanan claims that (WEB_7 2006), "I came to recognise that the creation, planning, and realization of the human-made world has been surprisingly, almost tragically, neglected in our culture."

Therefore, this thesis, which observes relations between product design and people from an emotional perspective, is worth to discuss as an attempt to contribute such a discourse.

3.2. Emergence of Emotional Attributes in Product Design

"Objects can have meaning, carry associations or be symbols of more abstract ideas. Designed objects, symbolic as well as utilitarian, predate any recorded language – they provide the earliest evidence of a cultural society and of symbolic reasoning (Ashby and Johnson 2002)." Products were used to express emotions, moods or status as well. For example, in the history of jewellery, there exist funeral jewellery, love and faith jewellery and status specific jewellery (Art Decor 2004).

Emotional attributes were always present within products even they were mostly limited to the appearance.

Form, color and material of the products have always been significant to their success and liking. The exceptional success of eighteenth century British ceramics

company Wedgwood depended on two aspects: first, to produce wares of consistently higher quality than competitors; second, the great importance attached to the *appearance* of the pots (Forty 1995). In order to strengthen the product appearance, Wedgwood company had hired the sculptor John Flaxman and painter George Stubbs to design the wares by the 1770s (Sparke 1994).

(a)

(b)

(c)

Figure 8. Examples of Wedgwood products (a)Portland vase (b) Borghese vases and pedestals (c) Black basalt vase

(Source: (a) http://www.wedgwoodmuseum.org.uk) (b,c) http://www.liverpoolmuseums.org.uk)

A manufacturer of cotton industry of 1840 expounded his opinion about the driving force of the trade as the design, the color, and the invention of art that is put upon the cotton (Forty 1995). If a manufacturer had more and better of all these things, the trade would rise.

With the start of radio broadcasting, first radios of 1920s passed through a transformation from crude objects composed of resistors, wires and valves to attractive products that are suitable to the perception of those days' households (Forty 1995). Because consumers were not willing to purchase the items. Manufacturers had understood that if these radios were to stand in the living rooms, a more sophisticated approach to design was needed. During the late 1920s and 1930s three basic types of solution were evolved:

1. To house the radio in a cabinet, which imitated a piece of antique furniture, and so referred to the past.
2. To conceal the radio within a piece of furniture that served some entirely different purpose, like an armchair.
3. To place the radio set within a cabinet designed to suggest that it belonged to a future and better world, which became more common as people become familiar with radio and found it less disturbing.

(a)

(b)

Figure 9. Types of radio sets of 1920s and 1930s (a) Archaic antique furniture type radios (b) Utopian future type radios from 1930s

(Source: http://http://www.ebay.com)

Each design transformed the original and 'primitive' radio sets out of all recognition. Transformation radio sets passed through was a sign of concern for aesthetic values of consumers.

Dictaphone and refrigerator are similar objects that followed the same way (Figure 10), from functional but crude item appearance to the accepted household appearance to enter into daily life (Forty 1995 and Sparke 1994). In both cases product appearance played the most important role.

(a)

(b)

Figure 10. Appearance transformations of dictaphone and refrigerator (a) Dictaphone of 1907 (left) and Edison voice writer of 1953 (right) (b) Refrigerator of 1920s (left) refrigerator designed by Raymond Loewy for Sears Reabuck in 1935

(Source: http://www.ebay.com)

Resistance experienced in most capitalist societies to the newness of things due to the changes they threaten is overcome by design (Forty 1995). Its capacity to make commodities perceived other than what they are has been the most important among design's potentials. Design's alteration of perception has been employed habitually to disguise or change artifacts' true nature.

But the first attempt to appeal to consumer's formal aesthetic senses in a professional manner can be dated to automotive industry of 1920s. Automotive manufacturers realised that the sales were declining due to the negative economical structure in the USA but they did not have any technical novelty to increase it. As a

result of raising competition, companies were forced to offer stylistic variation into the automobiles (Sparke 1994). General Motors established the Art and Color Section where operations were led by Harley Earl in 1927 (WEB_8 2006). This was the first department of its kind among major automotive manufacturers in USA.

Economical aspects of demand for emotional values in product design started to surface in the beginning of 1970s when the wealth of the societies grew to a significant point. In those years, need was not the primary reason for purchase any more. People were more concerned about their aspirations. Instead of durability or longevity users were favoring pretty, trendy, user friendly, safe and ecologic products (Art Decor 2004). After the 1980s, design profession caught a continual rise as a competing factor in the market, even succeeding quality (Art Decor 2004). Another change took place was the move from product-centered novelty to experience centered novelty. Design turned out to be involved in how people communicate with each other and how design can facilitate this communication. According to this new approach, design was interested in both product and product experience.

In those years, what Swatch understood in the wealthy West societies of post war, where wristwatches turned into commodities, was the obligation to appeal to the consumer's sense of style, taste and individuality in order to sell a wristwatch above $50 or higher (Ashby and Johnson 2002).

The emergence of this consumer behavior had developed gradually (Roberts 2004). Step by step, consumers grew stronger and were pulled closer to the issues such as design, quality, price, usability, availability, innovation, and safety. This process put emphasis on the intangibles of relationships and pulled emotion closer to the center.

In the 90s, consumers started showing less and less interest in the cumulative new functions since many products have reached a level of technical perfection that it has become difficult to discriminate on that basis. Credited designer Luigi Colani puts the situation as such, "Products no longer sell simply on their pure functionality alone" (WEB_9 2006). Thus, when the issue is to chose between two coffee makers of the same quality, people chose the one that gives a pleasant, desirable, or inspired feeling (Overbeeke and Hekkert 1999).

This tendency included cooperation with fields of social sciences such as psychology, sociology, anthropology, cognitive science and technology to improve design components of a product such as aesthetic pleasure – in order to enrich experiences of users. A similar approach is used in Philips Design to develop a thorough

understanding of a given cultural framework focusing on people: the way they live today, experience technology and consume goods, their dreams and aspirations, their situation in the community and so forth (Traldi 2003).

Steven Kyffin, Senior Director of Design Research at Philips Design, states that future of technology interaction will include being *meaningful, engaging, delightful and intuitive* (Kyffin 2003). This vision of Philips foresees system solutions that will fit into people's lives and act effectively yet unobtrusively. And the system requires a design approach seeking a thorough understanding of people's aspirations.

3.3. Relations Between Aesthetics and Emotional Design

3.3.1. Product Aesthetics

3.3.1.1. Aesthetic and Emotional Value of a Product

While exploring the emotional attributes of a design, aesthetics is the most appropriate term that quite captures the emotional attributes of products (Ashby and Johnson 2002). That is why designers try to manipulate emotional attributes affecting senses to create a desirable product. "The aesthetics in the design process is self-evident; it is in the heart of the design process" (Johansson et al. 2003).

In design sphere, aesthetics relates to the individual values and how meaning is attached to products (Önal 2006). The term 'aesthetics' concerns senses and related responses to an object (WEB_10 2006). If something is aesthetically pleasing to a person, it is 'pleasurable' and he/she likes it. If it is aesthetically displeasing to a person, it 'displeases' and he/she does not like it. Aesthetics involves all of the senses: vision, hearing, touch, taste, smell and emotions.

As well as aesthetic values are tied to intrinsic pleasure of beauty; emotions are highly tied to symbolic meanings and aesthetics (O'Shaughnessy J. and O'Shaughnessy N.J. 2002).

3.3.1.2. Definition and Aesthetical Understanding of a Product

The Oxford Dictionary of Art first gives the definition of 'aesthetics' used in the Oxford English Dictionary, as "the philosophy or theory of taste, or of the perception of the beautiful in nature and art" and then details the subject (Chilvers et al. 1997):

> It was first used about the middle of the 18th century by the German philosopher Alexander Gottlieb Baumgarten (1714-1762), who applied it to the theory of the liberal arts or the science of perceptible beauty. The scope and the usefulness of the term have been much discussed, and in Gwilt's Encyclopedia of Architecture (1842), it was still described as a 'silly pedantic term' and one of the 'useless additions to the nomenclature of arts' by the Germans. In the 20th century there is no general agreement about the scope of philosophical aesthetics, but it is understood to be wider than the theory of natural beauty and non-perceptible (e.g. moral or intellectual) beauty in so far as these are thought to be susceptible of philosophical or scientific study.

In the Scott, Foresman Advanced Dictionary, the term aesthetic is defined as (Thorndike and Barnhart 1993):

> 1-based on or determined by beauty rather than practically useful, scientific or moral consideration
> 2-having or showing an appreciation of beauty in nature or art
> 3-showing good taste, artistic. The term is derived from Greek '*aisthētikos*' that means sensible, perceptive < aisthanesthai (perceptive).

Third definition of the aesthetics in the Scott, Foresman Advanced Dictionary can be interpreted, in other words, 'appealing to the senses'.

Obvious in these meanings and definitions that there has been a debate concerning the practical benefits of aesthetics and beauty. Aesthetics is accepted to have nothing to report regarding the real structures of the world in contrast with science (Danto 1993). This lack of offering a tangible benefit led a doubtful view of aesthetics that can be generalized with the expression "Beauty is only skin deep". That is physical beauty is superficial. Vickerson criticises the pejorative use of the word "decorative" to suggest the objects in question are superficial and empty of meaning (Vickerson 2005).

In another article, Danto criticises extrusion of aesthetic considerations from the realm of function and utility, and elimination of ornament and decoration from the domain of architectural design (Danto 1996).

In the design sphere, the symbol of this argument is the maxim “form follows function” by architect Louis Sullivan (1856-1924) that is accepted as that a properly functioning product is already beautiful.

Papanek claims that although the implication of “form follows function” is that as long as the functional requirements are satisfied form will follow and seem pleasing, with a misunderstanding of the statement, the interpretation turned to “*ideal* form will always work well” (Papanek 1992). To Papanek, thereafter, the statement was used as a defense for all the sterile, operating room like furniture and implements of the twenties and thirties. Papanek accepts aesthetics as one of the many aspects of function. Aesthetics is one of the most important tools of the designer, a tool that helps in shaping forms and colors into entities that move and please people. Aesthetic products are beautiful, exciting, filled with delight, meaningful that will help designer to fulfill needs of human for structures and tools that are enriched beyond severely utilitarian.

Dormer suggests that to base 'form follows function leads to beauty' statement on anonymous, utilitarian objects from the past is ironically elitism (Dormer 1993). To Dormer, this is the tendency of 19th or early 20th century designers who try to divine general causal principles between function and beauty after seeing great beauty in the simple, engineered structures in the anonymous artifacts of 18th and 19th century industrialization. The point Dormer criticises is the disregard of the artisans and engineers who designed and built those artifacts. Contribution of the anonymous artisans was ignored and thought that function could determine its own aesthetic. But it was forgotten that beauty depends on individual’s deliberate choices.

Jeremy Myerson who criticises, in this age of technology, that people lost ability to *enjoy* products and this is above losing the ability to make, mend or operate things (Myerson 1998). Myerson exemplifies John Makepeace, an awarded craftsman in contemporary furniture, for his perspective. John Makepeace claims that his works are totally committed to the function and does not regard such a commitment as automatically eliminating decoration: “Function needs a more generous interpretation,” he says. “It has been too narrowly defined. It means more than just use. Enjoyment and pleasure are part of the function of an object too.”

Two studies conducted in the early 1990s, first in Japan second in Israel revealed an important issue: “Attractive things work better” (Norman 2004). In the first research conducted in Japan, researchers Masaaki Kurosu and Kaori Kashimura tested ATM kiosks. ATMs were identical in function, button number and operation procedure

however some had attractively designed buttons and screens whereas some had unattractively designed ones. Outcomes were surprising. Japanese participants of the research found the attractive ATMs easier to use.

The second research started with the doubt of Israeli scientist Noam Tractinsky upon this study. Tractinsky's belief was aesthetics and usability were unlikely to correlate. According to Tractinsky, aesthetic perception was culture based. So the results were not to be surprising for a culture with a strong aesthetic tradition like Japan. But in an action oriented society like Israel the same results should not be expected. Tractinsky decided to redo the experiment in Israel. Layouts of the ATMs were brought and translated into Hebrew. Tests were conducted under strict controls not to allow any flaw. Nevertheless the results were parallel with the Japan sample with stronger outputs.

Recent arguments in the design sphere focuses on the argument that modern design has placed too much emphasis on performance issues and not enough on emotional aspects due to the increased recognition of the role of emotion in decision making (Tractinsky 2004). Some of these emotional aspects are pleasure, fun, and excitement, which are fundamental motivators of human behavior, and which are clearly affected by aesthetics.

When people feel that products do not work well they get frustrated and stressed. Products that malfunction, or work in a way that is not in tune with how people live, cause stress and burnout – which, afterwards lead serious health problems – became the focus of an observation conducted by an industrial consultant (Hjelm 2003).

Hjelm suggests that for a successful interaction, user must believe that he/she could understand the product, manage it and find the product meaningful enough to wish to cope with it. Hjelm accepts product aesthetics as one of the things that make a product meaningful. Because a product is meaningful when it has emotional significance to the user, which makes user wish to interact with it.

In the end, Hjelm states that aesthetics can be understood not as a way of making beautiful things, but an epistemology that helps understanding and interpreting reality to make it meaningful. The key to create a world of artifacts that makes sense, both in the cognitive and emotional sense of the word, lies in aesthetics, the total experience of the product.

For example driving satisfaction in a washed and polished car is higher. People feel better in clean and fancy clothes after a relaxing bath. When a well-balanced,

aesthetic tool is used people perform better in fields like gardening, woodworking, tennis, ski (Norman, 2004).

The crucial issue here is the fact that meaningfulness supports the motivation for problem solving. Because meaningfulness makes people feel connected, committed and emotionally engaged. That is the reason why participants stated that more attractively designed ATMs worked better in the experiments Tractinsky, Kurosu and Kashimura conducted.

3.3.1.3. Aesthetic Experience of A Product

There are basically three sources in design: function, meaning and pleasure (Postrel 2004). Postrel claims that although function is important and is increasingly taken for granted, it is not the differentiator. The added value that people buy comes from meaning and pleasure: Aesthetics, the look and feel. Postrel states that, biologically, people are visual and tactile creatures. Thus aesthetics is the way of communication through the senses. So what is the role of aesthetic experience in the product experience?

User experience is the overall experience, in general or specifics, a user has with a product (WEB_11 2006). The user experience encompasses the understanding compiled through all of the senses. The boundaries of an experience can be expansive and include the sensorial, the symbolic, the temporal, and the meaningful.

Interaction designer Jodi Forlizzi claims that emotion plays a role in understanding and communicating about what people experience (WEB_12 2006). Emotion shapes the gap that exists between people and products in the world. Emotion affects how people plan to interact with products, how they actually interact with products, and the perceptions and outcomes that surround those interactions. Forlizzi states that, by citing philosopher John Dewey, experiences have emotional, practical, or intellectual qualities.

In addition to the multidimensional nature of aesthetic experience, aesthetic appraisals of products possess two special features (Yili 2003):

> First, they tend to be multi-modal; and second, they tend to be interactive. These two features distinguish aesthetic appraisal of products from aesthetic appreciation of arts, and pose special and fascinating challenges to engineering aesthetics. Let me discuss the two features below. First,

> aesthetic appraisal of product and system design tends to be multi-modal in the sense that more than one sensory modality is likely to be involved in the process. While fine art appreciation is primarily visual, aesthetic appreciation of a product or work system may involve the interplay between a person's visual, auditory, olfactory, tactile, haptic, and even proprioceptive systems. For example, the visual appearance and the surface texture of a perfume bottle are often as important as the perfume itself in a consumer's aesthetic evaluation of the perfume.
>
> Second, aesthetic appraisal of a product or system may be not only multidimensional and multi-modal, but interactive as well. In other words, the consumer as an appraiser may not be a passive examiner of the appraised object. The appraiser may actively interact with the object, test its reactions, and communicate with the appraised, which may or may not 'communicate back'. For example, before purchasing a new car, we not only look and feel the car in a parking lot, but always test drive it to see how it responses in various driving situations and whether it offers us the 'driving excitement'.

The nature of aesthetic experience or aesthetic response consists of two factors: One is pleasure, satisfaction, or liking (Honderich 1995). The second is experience: A particular way of experiencing or attending to objects. Honderich explains the role of emotion in the relation between a person and an artwork:

> Where expression is given the chief explanatory role, artworks do not merely describe or represent emotions, they more directly communicate an artist's highly specific moods and feelings, and enable the appreciator to experience them also. The artist typically starts with a confused notion of what he feels: his creative work clarifies and stabilizes it. What is true in the theory is that works of art are certainly bearers of subtly discriminated emotional qualities, the 'feel' of human life as lived – i.e. they are 'expressive': and that is partly why we treasure them.

Honderich bases this suggestion on the statement that judgments of value are rooted in emotions and Hume's classification of the contents of the mind into impressions and ideas. In this classification, impressions are sensations, passions and emotions; ideas are the faint images of impressions in thought, reflection, and imagination. In other words, values and impressions that are generated by humans towards objects and related experiences are directly influenced by emotions.

On such a ground where sensorial, symbolic and meaningful components of an experience are highly appreciated it will not be baseless to conclude that aesthetic experience generates an important part of user experience and that aesthetical experience generated by a product is directly influenced from emotions.

Fors and Stolterman suggests that if design profession aims to give people an environment that will help them live full and rich lives, there is a need for a different approach based on the notion of the aesthetic experience for two reasons (Fors and Stolterman 2003):

- Traditional analytical and reductionistic approaches based on a simplified understanding of the subject-object (user-artifact) relation focusing on functionality, user-friendliness, usability, etc. is inefficient to fully solve the problems. With traditional approaches, more time is needed for analysis when the reality gets more complex whereas aesthetic experience is immediate and makes it possible to deal with complexity and meaning making at another level.
- Aesthetic experiences can also identify pervasive qualities in an environment. An aesthetic experience involves a realization of meaning through interaction with the inherent qualities of the object that is more than the projection of meaning from the person to the environment or vice versa.

3.3.2. Elements of Design Aesthetics

3.3.2.1. Analytic Elements of Design

To convey the value of aesthetics, Ashby and Johnson start with evaluating its absence (Ashby and Johnson 2002): Anaesthetics causes negativivity: it numbs the senses, suppresses feelings. Anesthetics is a lack of sensation whereas aesthetics does the opposite: it arouses interest, stimulates and appeals to the senses, particularly to the sense of beauty. A product can carry attributes of aesthetics and emotions. Aesthetic attributes are directly related to the senses: sight, touch, taste, smell, and hearing. Sight includes the form, color and texture of the material product is made of. Emotional attributes describe how a material or product makes people feel – happy, sad, threatened etc.

Table shows a general compilation of many different things that contribute to the analytic elements of design (WEB_10 2006).

Table 3. Analytic elements of design

Vision	Hearing	Touch	Taste	Smell
Color	Loudness	Texture	Strength	Strength
Shape	Pitch	Shape	Sweetness	Sweetness
Pattern	Beat	Weight	Sourness	'Pleasantness'
Line	Repetition	Give	Texture	
Texture	Melody	Comfort		
Visual weight	Pattern	Temperature		
Balance	Noise	Vibration		
Scale		Sharpness		
Movement		Ease of use		

Related to the analytical elements of design, there can be four different 'pleasure types' to be considered (WEB_10 2006).

Physio-pleasure: Pleasure derived from the senses of touch, smell, sensual/sexual pleasure etc. For example the smooth curve of a hand-held product or the smell of a new car.

Figure 11. Products of Physio-pleasure

(Source: http://www.ergonomics4schools.com)

Socio-pleasure: Pleasure of interaction with others. This could be a 'talking point' product like a special ornament or painting, or the product could be the focus of a social gathering such as a vending machine or coffee machine. This pleasure can also come from a product that represents a social group, a particular style of clothing that symbolizes a social identity.

Figure 12. Products of Socio-pleasure

(Source: http://www.ergonomics4schools.com)

Psycho-pleasure: Pleasure of the satisfaction felt when a task is successfully completed. Pleasure also comes from the extent to which the product makes the task more pleasurable, such as the interface of an ATM cash machine, which is quick and simple to use. It is closely related to product usability.

Figure 13. Products of Psycho-pleasure

(Source: http://www.ergonomics4schools.com)

Ideo-pleasure: Pleasure coming from entities such as books, art and music. This is the most abstract pleasure. In terms of products, it is the values that a product embodies, such as a product that is made of eco-friendly materials, and processes that convey a sense of environmental responsibility to the user.

Figure 14. Products of Ideo-pleasure

(Source: http://www.ergonomics4schools.com)

3.3.2.2. Sociocultural Elements of Design

Social structure is the fundamental descriptive factor for user's preferences related to taste where personal taste preferences are formed in parallel with the aesthetic preferences of the individual (Asatekin 2005). To Asatekin, aesthetic structure is one of the most evident socio-cultural qualities of a society. Social dynamics drive individuals adopt certain aesthetic values (forms, colors, textures, proportions, sounds etc) gradually and these values influence the taste structure of the user.

The difference in cultural taste can be easily observed between European and Asian cultures that show distinctive and contrary aesthetic values because of two reasons (Krishnapillai 2003):

- Asian cultures do not share the Euclidean conception of the world based on the Euclidean geometry constituted of lines, squares, triangles and circles.
- Asian cultures' belief in the primacy of nature assesses Euclidian forms unnatural and contradictory to nature. Instead, the simple and the complex geometric forms of nature are espoused as sources of value and inspiration.

Krishnapillai states that while aesthetic movements such as the Cubist, the Bauhaus, the Postmodernist, were built on firm Euclidean foundations Asian counterparts preferred natural forms for their axis of perfection.

Figure 15 exemplifies such differences by the means of works of two European and two Asian designers: Berlin and left-handed Steltman chairs by Dutch designer Gerrit Rietveld, Highlands sofa by Spanish designer Patricia Urquiola for Moroso furniture compnay, Butterfly stool by Japanese designer Sori Yanagi and Saruyama waiting seats by Japanese designer Toshiyuki Kita for Moroso furniture company.

(a)

(b)

(c)

(d)

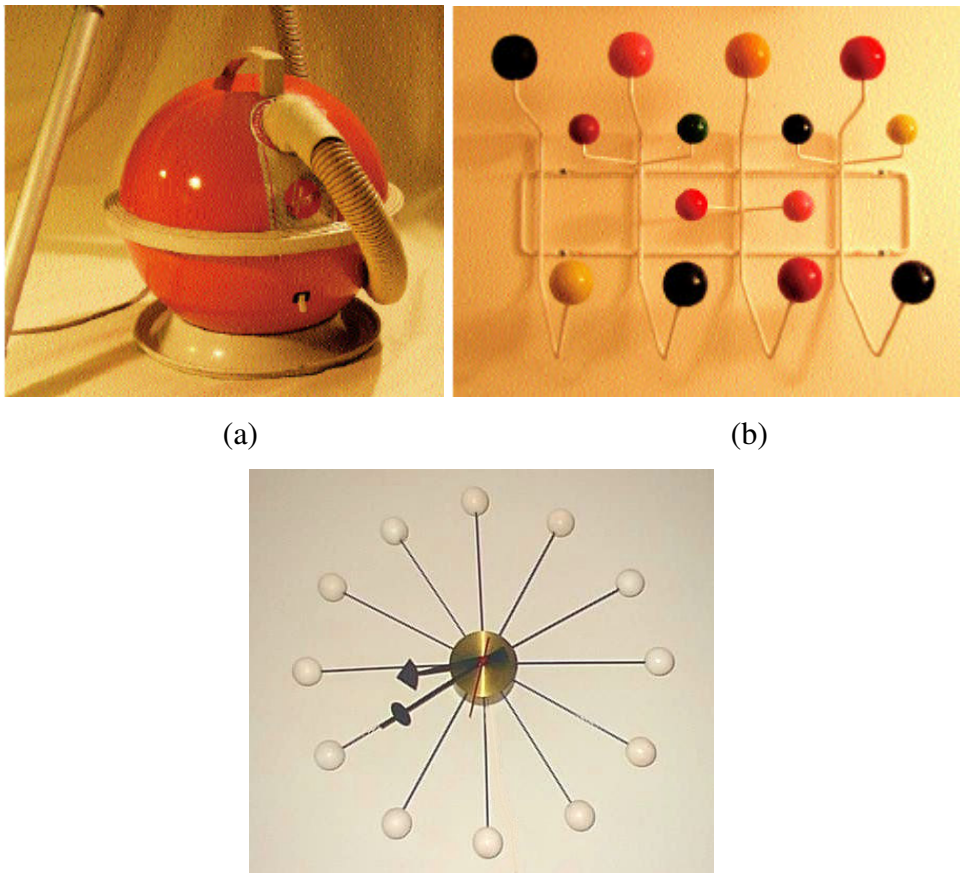
(e)

Figure 15. Cultural taste differences between Europe and Asia in product design (a) Berlin chair by Gerrit Rietveld (b) Left-handed Steltman chair by Gerrit Rietveld (c) Highlands sofa by Patricia Urquiola (d) Butterfly stool by Sori Yanagi (e) Saruyama waiting seats by Toshiyuki Kita

(Source: (a,b,d) http://architonic.com, (c,e) http://www.moroso.it)

Society, thus aesthetic values also change from period to period. Cultural experience involves aesthetic values and interaction with the objects one encounters within it (Boradkar 2004). In the 1950s the world was showing a great interest to nuclear power and related issues. The atom figure symbolizing the nuclear domination and faith

in the overwhelming qualities and rewards of science in the 1950s inspired for countless examples of products including the spherical vacuum cleaner named 'The Constellation' designed by Hoover in1954 and Ball Clock designed in 1947 by Irving Harper for George Nelson's office which looks like electrons revolving around a nucleus (Figure 16) (Boradkar 2004). Ray and Charles Eames's Hang-It-All (1953) hanger reflect the idea of spatial/atomic metaphors in a subtle everyday even ordinary object.



(a) (b)

(c)

Figure 16. Influence of period on product design (a) the constellation vacuum cleaner by Hoover (b) Hang-It-All (1953) hanger (c) Ball Clock

(Source: (a,b) Boradkar 2004, (c) http://www.jetsetmodern.com)

Objects that do not suit the normal social standards are generally considered of bad taste. Ford Edsel, launched in 1957 is an example. In a period when America's fascination with aviation (Jet Age) reflected itself on automobile design with tail fins and rear lights simulating 'rocket-burn' (Woodham 1997), Ford Edsel showed prominent differences with its front-end bonnet and grille when other cars of the mid-1950s had basically two headlights and a horizontal grille (Haig 2003) (Figure 17).

(a) (b)

Figure 17. Typical automobiles of 1950s (a) Cadillac Fleetwood of 1959 (b) Cadillac Coupe De Ville of 1955

(Source: (a) http://www.allsportauto.com (b) http://www.affordableclassicsinc.com)

Edsel's impact ring (horse collar) was in the middle while many other cars of the period had horn-like pieces attached on the impact ring (Figure 17b) – suitable for the masculine image – it set Edsel apart (Figure 18).

Figure 18. Ford Edsel of 1958

(Source: http://http://www.edsel.com)

Automobile reviewers were mostly negative on this aspect and commented that Edsel looked like 'an Oldsmobile sucking a lemon' or the front-end grille was less like a horse collar, and more like a toilet seat (Haig 2003). The deviance from social standards was at such a point that some customers said that the grille looked like a 'vagina with teeth'. Simply Edsel 'didn't quite fit into people's vision of a car of 1950s.

In the 2000s, general aesthetic value of consumer products are transparency (Apple's iSub, IDEA 2000 Gold Award Winner), slimness (Nec L1 mobile phone) and

lightness (Samsung NEXCA SDC-80 digital camera) shown in Figure 19 (Nussbaum 2000).

(a) (b)

(c)

Figure 19. General aesthetic value of consumer products in 2000s (a) iSub (b) Nec L1 mobile phone (c) Samsung NEXCA SDC-80 digital camera

(Source: (a,c) http://www.idsa.org (b) http://www.gsmarena.com)

Within the sociocultural elements of design, fashion is one of the most important factors affecting aesthetic preferences especially in today's world. Aesthetics help bridging the gap between technology and user by utilizing fashion. Kipöz argues that adoption of technology through different social classes and massification of the new technological mode could only be explained by fashion and new trends (Kipöz 2003). To Kipöz, technological innovation at the beginning of the cycle (product launch) is only affordable to the first users with premium prices. However the technological innovation can hardly be marketed without the style – which customers mostly pay for – that is in tune with new aesthetical trends. During the cycle with few modifications –

most of them are styling – the product is reintroduced to the market for two reasons: First, to dress up and place the technology into an aesthetic status. Second, to lengthen its life span in the market. Kipöz exemplifies the situation with mobile phones. Kipöz considers mobile phone as an indication of our social and cultural experience, and aesthetical understanding of technology. In this context, importance of the mobile phone is its role of; transmitting technological innovation by the use of communication, overcoming the division between style and technology; and for its capacity to transform the aesthetical understanding of technology and creating its own fashion as an output of a social experience of its time.

Seymour Powell design company states that people buy fashion as much as time while explaining the concept for B-Cool wristwatch (WEB_13 2006):

> …so instead of changing the inside, you can now just change the *outside*…B-Cool isn't a watch with a strap…it's a bracelet that tells the time. The watch capsule just snaps out of one style and clips into the next, letting you expand your temporal wardrobe as much as you want…any time you want.

Figure 20. B-Cool wristwatch

(Source: http://www.seymourpowell.com)

Effect of novelty and typicality upon a product's evaluation is another issue affecting aesthetic preferences. Novelty, which is related to attraction, and typicality which is related to 'goodness of example', easy-to-classification and familiarity generally influence each other in a negative way (Hekkert et al 2003). Increasing novelty decreases typicality whereas increasing typicality decreases novelty. Hekkert et al. conducted three separate experiments with 79 participants (39 males and 40 females) measuring their evaluations of selected instances of four product categories (sanders, telephones, teakettles and automobiles). Results that are not exact but empirical and acceptable show two things:

- Novelty and typicality influence aesthetic preference positively by themselves alone.
- People prefer products with an optimal combination of both aspects. Novelty makes a positive effect as long as it does not affect typicality whereas, typicality makes an positive effect as long as it is not to the detriment of novelty.

Philippe Starck's table lamp Miss Sissi exemplifies the degree how typicality and novelty co-varies (Hekkert et al 2003). Miss Sissi can be designated as novel because of its synthetic material, while, at the same time, it can be seen as a typical table lamp due to its overall form. This shows that although a high negative correlation is often found between typicality and novelty; they are not to be conceived as opposite poles of one and the same continuum.

Figure 21. Miss Sissi table lamp

(Source: http://www.ylighting.com/misssissi)

On the other hand Dieter Rams criticises aestheticism designed for consumption (Rams 1998): "The 'purchase attraction' aesthetics upon which design today is almost exclusively based, and which only fuels the destructive product extravagance, will give way to an aesthetic which supports long-term use and the conservation of resources." With such a criticism, Rams draws attention to the power of aesthetics in longevity of a product, an issue this thesis defenses.

3.3.3. Fundamental Design Elements Evoking Emotions

3.3.3.1. Form

Form of a product can be aesthetically important as much as the content (WEB_14 2006). Form's influence is at such a level that spontaneous emotions, mostly related to the visible structure, generally overshadow the advantages of the concept (Jacobs 1999). Thus the market success of industrial products – so obvious in today's market – strongly depends on their aesthetic character, i.e. the emotional reaction that the product is able to evoke (WEB_15 2005).

In parallel with such a market demand, Tom Dixon, a designer, claims that today's designers are much more concerned about the shape of the object and their own personal evolution within it (WEB_16 2006). Tom Dixon treats the form as a result of an understanding of materials and a belief in improving functionality.

Seymour Powell design company suggests the form of a product is neither composed of the things from which it is made of, nor by its functionality (WEB_17 2006). Form is function. For them, styling (the conception and definition of form and finish) is far from meretricious; rather it is a powerful and emotive tool for seducing, simplifying and clarifying, as well as for communicating and reinforcing function, purpose, and cultural context.

The form of a product is its immediate asset that attracts the consumer and influences the purchase decision. Some products are so aesthetically appealing that users do not throw away the product and keep for a second, altered use or decorative purposes. Glass bottles are one of the best examples. Many alcoholic beverage bottles like wine, whisky, vodka etc. are kept and used as water bottle, candle holders or vases like the Absolut vodka bottles in the Figure 22.

Figure 22. Absolut vodka bottles as a vase

Such user behavior can be taken as a reincarnation of the product due to its formal aesthetics. In parallel, a contemporary approach to emotional design considers giving products a chance of rebirth (reincarnation) for the spiritual continuation that could also extend the product's emotional life in addition to sustainable and environmental sensitivity (Kipöz and Akan 2004). The project is based on three perspectives:

- Relationship between lives of human beings and their products is deeper than what is assumed generally.
- Products, which make us happy, (re)think and ease our daily-life, actually have their own life: The birth represents the product's start-up phase through an idea; childhood represents manufacturing stage; adolescence refers to marketing and acquisition of the product; adulthood refers its use and finally death refers to its disposal or re-use.

• Between design and production, usage and recycle collected experiences of products re-shape them.

Project's argument is to explore the possible ways of extending emotional life of non-used products during after-use for re-use. For new emotional experiences, the reincarnation of the product's soul in another body of design object with a different function was employed instead of traditional methods such as recycle, vintage, retro or second-hand.

Perspective of the project is 'philosophy oriented design' that aims not to follow the popular taste of Zeitgeist and the culture of consumption by installing experiential, occasional, praiseworthy personal, indignant, protesting, reactive, sensitive, expressive or disappointed emotions. Thus the project was aimed to design *products with lives*, concerning the product's satisfaction as well as the consumer satisfaction with the statement of *only satisfied products can satisfy people*.

Project positions the post industrial designer to act as a designer-maker, through different ways of re-use in order to overcome artificial obsolescence. Aim is to compensate the alienation between designing and making of the industrial society. With the new craft methods such as *recycling, ready made* and *bricolage,* designer gives the objects and things a second chance of living in a narrative way. The use of hand, mind and senses in a coherency in a craft sensibility facilitates new manner of knowing and materially interacting with it.

Reincarnation aims to give the product a new meaning/function to keep its personality alive for new emotional experiences in order to let the product live forever. This approach led furnitures and home accessories designed by Erdem Akan of Maybe Design and exhibited in Art Décor Fair 2003 in Istanbul under the title *may*be reincarnation.

Based on a philosophy that encourages designers to listen to the products' sub-conscious levels to understand their dreams because only satisfied products may satisfy people, potential old products (such as historical design icons, loosers etc.) were analyzed to be matched with their new life alternatives through rewriting their life stories, regarding their previous and new lives.

TV-lamp "channel 90" was designed based on the lighting function of an old television screen when the transmission was over late at night waiting to be switched off. The screen is reincarnated to emphasise its lightening function into a body of a night lamp. The 'LP' bowl resulted after the re-design of a long play record.

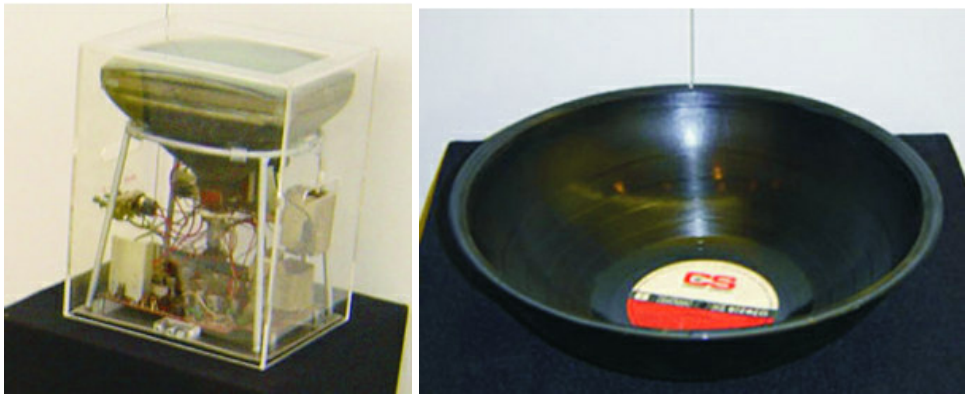


Figure 23. TV-Lamp channel-90 (left) and LP bowl (right)

(Source Kipöz and Akan 2004)

The project suggests that maintaining and re-discovering the emotions of the living ones can provide new emotional experiences for designer, user and the product. In addition to expanding product's life with a sustainable sensitivity, creating a unity between its 'body and soul' is the only way to respect the product's emotions. Reincarnating the objects into products provided a depth understanding of products' emotional lives. The interaction between the designer and the product through the 'making' phase, altered the interaction between product and the prospect user in terms of both designer's, user's and the product's emotions.

3.3.3.2. Material

Kesteren et al. states that materials play an important role in the experiences people have with products (Kesteren et al. 2005). Product experiences include the emotions that users have when they interact with products. During interaction, users' senses are in contact with the materials of those products. Users see colors of materials, feel texture and weight and hear sound. These sensory experiences are part of the user experience. Materials are one of the tools product designers use to give a desired sensory experience to the users. Product designers select materials to elicit the right associations. For example the metals used in a Rolex is aimed to express a feeling of status. So product designers use materials to influence product personality.

Because besides proper function and ease of use, a product must have a personality that satisfies and gives delight, in which materials have a significant role (Ashby and Johnson 2002).

Govers claims that product personality is related to congruity between the personality of a person and the personality of his/her product since people prefer products with a personality that is similar to their own (WEB_12 2006). To Govers, this strategy brings attraction to design. Govers suggests that self-expression is one of the reasons (Govers and Mugge 2004). Self-congruent products are the ones that are similar to one's identity in some way. Thus these products can provide the symbolic function of self-expression.

Kesteren et al. defines product personality as the appearance of the product and reactions of user's senses on it as well as the associations it elicits in the user (Kesteren et al. 2005). Product personality is one of the aspects, which contributes to product experiences. Product personality is the combination of aspects including materials and shape that elicits desired user experiences (Govers and Mugge 2004).

Material selection alters the impression of the same 'product appearance' (Figure 24). Trashcans in the figure below have different personalities due to material difference. The plastic one is more to look ordinary and cheap whereas the metal one is more to look exclusive and clean (Kesteren et al. 2005).

Figure 24. Influence of material selection on the impression of the same product appearance

(Source: Kesteren et al. 2005)

Although the choice of materials in product design expresses desired aesthetics perception depends on time, culture, demographics, taste, and more; thus associations and attributes of materials listed below are not exactly certain (Ashby and Johnson 2002):

Wood is a natural material with a grain that gives a surface texture, pattern and feel that other materials do not have. It is tactile – it is perceived as warmer than many other materials, and seemingly softer. It is associated with characteristic sounds and smells. It carries the associations of craftsmanship tradition. And it ages well, acquiring additional character with time. Things made of wood are valued more highly when they are old. Polished wood carry associations of its traditional uses: the sense of warmth, civilization and discreet luxury.

Wood's naturalness gave a humanizing face and a plain attraction to the Paimio armchair (Figure 25) of Alvar Aalto than the uncompromising tubular steel essays of many modernists out of Scandinavia (Woodham 1997). Since Armchair was designed for Paimio Tuberculoses Sanatorium, Aalto's aim was to emphasise the feeling of homeliness created for the long-stay patients with a soft, flowing, organic form and material choice (WEB_18 2006). Birch – the wooden material used in the chair – ages gracefully, taking on a rich, honey color with a beautiful patina (WEB_19 2006).

Figure 25. Paimio armchair designed by Alvar Aalto

(Source: http://www.hermanmiller.com)

Paimio armchair also reveals designer's interpretation of modernist canon as he says, "The architect's task is to restore a correct order of values…it is still the architecture's duty to attempt to humanize the age of machines. But this should not be done without regard for form…" (WEB_20 2006).

Metals seem cold, clean, and precise; ring when struck (Ashby and Johnson 2002): Machined metal looks strong; thus accepted and trusted. By their nature, metals suggest engineering. Metals can be put into flowing forms like intricate lace or cast into solid shapes with integral detail and complexity. Brushed aluminum carries the sense of clean mechanical precision. Metals can age well too, acquiring a patina that makes them more attractive than when newly polished – the bronze of sculptures, the pewter of mugs, the lead and copper of roofs. Metal used in the camera bodies emphasises on the engineered quality of the item. "The fuel cap of the Audi TT machined from stainless steel and attached by eight Allen screws is an expression of precision technology that implies the same about the rest of the car (Ashby and Johnson 2002)."

Ceramics and glass accept almost any color. Their total resistance to scratching, abrasion, discoloration and corrosion relates to longevity. They are materials of craftsmanship such as Venetian glass, Meissen porcelain, Wedgewood pottery. Also today ceramic is additionally associated with advanced technology: kitchen stove-top.

Glass flower vase, Marco designed in 1962 is an example of excellence at a simple play of form that turned a small household item into a sculptured art piece (Wulfing 2003).

Figure 26. Glass flower vase Marco

(Source: Wulfing 2003)

Polymers, generally named as plastic, used to be associated with cheap imitations due to the early use of plastics: To stimulate the color and gloss of Japanese handmade pottery, which were much valuable in Europe (Ashby and Johnson 2002). On the other side, polymers feel warm, much warmer than metal or glass and plastics are associated with modernity. But their gloss is easily scratched and their colors fade – they do not age gracefully. Another devaluation of value polymers brought was the

availability and disposability. Small radios and cheap even smaller pocket calculators approached the status of a ballpoint (Dormer 1993).

But the use of familiar materials in an unfamiliar way is also a creative decision. In the high performance camera 'ALPA of Switzerland' (Figure 27), the unusual use of the beech for the hand grips suggests hand-crafted quality and an exceptional attention to aesthetics (Ashby and Johnson 2002).

Figure 27. High performance camera, 'ALPA of Switzerland'

(Source: http://www.alpa.ch/)

Materials can also be listed according to the associations they attribute briefly (Ashby and Johnson 2002): Gold, silver, platinum, diamond and sapphire have associations of wealth, success, sophistication and lasting value; granite have associations of permanence; steel have associations of strength. Ashby and Johnson state that these associations are strongly linked to social context. A polystyrene drinking glass is almost visually indistinguishable from a glass one, but when picked up, it feels lighter, warmer and less rigid. When tapped, it sounds quite different. The material's impression is so different from glass that, for example, a polystyrene drinking glass cannot be acceptable in an expensive restaurant.

Materials also contribute to the user's sense of functionality. In the in-house design department of Handspring (producer of Handspring and Palm) responses of the buttons on the devices upon being pressed is an important subject (Tristram 2002). Small pieces of metal (snap domes) placed in the buttons make all the difference in how a device button responds to pressing act of a user, which in turn can mean the difference

between a keyboard that works for human beings and one that does not. That tactile feedback establishes the confidence to persuade the user that the device functions properly.

Real life examples demonstrating the opposite effects of materials is Divisumma 18 electronic calculator designed by Mario Bellini in 1972 for Olivetti (Dormer 1993). Divisumma 18 electronic calculator caught attention of other designers with its continuous, flexible, rubber-skin keyboard. The catalogue of Bellini retrospective exhibition, which was held at the MOMA, New York, in 1987, says: "The skin, which protects the machine from dust, is anthropomorphically suggestive. Articulated push buttons, covered with soft rubber skin, are like nipples. Here, the issue is not on calculating and power, but on stimulating a sense of pleasure."

Figure 28. Divisumma 18 electronic calculator

(Source: http://www.moma.org)

Olfactory emotions evoked by materials are as important as tactile feelings (Jacobs 1999):

> I worked for a manufacturer of office furniture. We, as designers within that design department, found that there existed a very interesting sheet metal, covered with plastic. We thought that we could use this material very well as a table-top for our desks. The main problem was however that we could not weld the profiles we needed for strength under the sheet metal, because that would leave marks on the plastic cover. So we came in contact with Loctite, one of the world's leaders in glue-applications. Loctite developed a glue that would suit our production possibilities and a first set of table-tops was produced. We placed this set, as a test, in our own office and after a week there where some minor complaints. The test-users didn't like the new tops, they didn't feel right.

We found that the glue had a vague, bad aroma, and this was the reason for the emotion of disgust from the users.

3.3.3.3. Color

Color is part of the emotional attributes of a product. To Linton, color is conceptual; it is pure idea, pure intellectuality and pure *emotion* (Öksüz 2004). Leatrice Eiseman, the executive director of Pantone Color Institute and director of Eiseman Center for Color Information and Training, defines color as a catalyst for feelings (Eiseman 2003). "Color is very emotional. It's directed by how we live our lives. We want colors around us; they make us feel good," says Melanie Wood, a color and design consultant and past president of Color Marketing Group (CMG), a non-profit color forecasting association (WEB_21 2006).

Colors of a product influence people's mood, thoughts, emotions and physical reactions (WEB_22 2006). Mandel cites Edward Tufte to stress the importance of color in design: "Of all design elements, color most exemplifies the wholeness of design, the necessity to reason globally" (Mandel 1997).

Color choices can exert a big impact on consumers' assumptions about the products. Patsy Kuipers who worked at DuPont as a color and design specialist states that consumers' judgments of an object occur within 90 seconds of initial viewing and this assessment is mostly based on color (WEB_23 2006). Kuipers underlines the importance of color by stating that right color brings the success in the market.

Angela Wright, a Fellow of the Royal Society of Arts and a world expert on the unconscious effects of color, identifies a problem about color selection of a product (WEB_24 2006): If the color is not properly related to the basic proposition of the product the consumer will not necessarily buy it although the vividly colored item has made an initial impact. At this point, critical issue is to put together a coherent range of colors to match the essence of the product with the psychology of its target market, and communicate the product's benefits effectively. Shortly, right color, on the right product for the right consumer brings success. To Wright, that is why many companies have started to make full use of the principle that fashion designers recognised long before: The color of a product (or a garment) will determine its popularity and market success.

Karen Surcina, color marketing and technology manager for DuPont Automotive Systems, states that nearly 40 percent of automobile owners are likely to switch brands if they cannot get the color they want (WEB_25 2006). To keep up with the consumers' demands of color, DuPont watches key indicators such as home and clothing fashions and consumer electronics to anticipate color trends. In addition, experts of DuPont participate in professional design organizations.

Pantone, a worldwide provider of color systems and technology for the selection and accurate communication of color, provides also "emotional color cues" with its products showing feelings triggered by featured colors to help their consumers select product colors based on the image or message they aim to convey (WEB_22 2006). For such a purpose Pantone updates its colors seasonally, based on fashion color trends that are determined by Pantone's color forecasts and color psychology expertise.

Hasip Özbudun, design and marketing director of Budun Design Company, takes color as a part of fun attributes of a product with its amusing and surprising assets (Art Decor2004). Color also helps a product leave a mark in consumer's mind. Budun underlines the transition of trendy colors to the industrial products by stating that Budun Design Department is bound to choose successful colors in the market.

The table showing the emotional attributes of colors has been compiled from different sources: A Comparative Study On Differences In Color Determination Process And Criteria Of Leading Automobile Companies (Öksüz 2004), Consumer Behavior in Fashion (Solomon and Rabolt 2004), and The Lüscher Color Diagnostic developed by Swiss psychotherapist Dr. Max Lüscher (WEB_26 2006 and WEB_27 2006) to provide a wider perspective.

Table 4. Positive and negative emotional attributes of certain colors

COLORS	POSITIVE ASSOCIATIONS	NEGATIVE ASSOCIATIONS
BLACK	Having class, sophisticated, sexy, dignified, serious, mysterious, concealment, conventional, conservative nothingness, extinction, "No", end.	Troubled state, relinquishment, death, ominous, depressing, danger, foreboding, evil
GREY	Conservative, practical, neutrality, un-commitment, non-involvement, concealment wisdom, dependable, secure, safe	Ghostly, somber, mousy, status quo
WHITE	Purity, peace, perfection, light, cool, clean, pure, innocent, simple, "Yes", beginning	Sterile, surrender
RED	Warmth, hunger, excitement Resourcefulness, domination, conquest, winner, achiever, competitive, daring, hot, impulsive, energy, intense, active, love, passionate Moral responsibility, morality, ethics, justice, rich, elegant, refined. Comfort, a zest for life, contentment, warm, elemental, primitive, snug	Seduction, panache or ritualistic display, subtle powers of discrimination, Rage, blood, danger, stop, aggressive Symbol of shame and guilt,
ORANGE	Energetic, vibrant, glowing, heat, harvest sunset, warm, inviting, ripe, juicy	Loud, overbearing
YELLOW	Entrepreneur, wisdom, enlightenment, luminous experimental and empirical, warm, friendly, sunny, cheerful, life-giving, tranquility, neutral, classical, happiness, cheerfulness, expansiveness, lack of inhibition	Impulsiveness, impression of flair
GREEN	Wit, healing, Exuberance of nature, confidence, self-expression, fertility, continuity, fruitfulness, productivity, creative, generative, generosity of nature, moist, eternal, victory, cool, refreshing, natural, restful, persistence, resilience, grit, self-defense mechanisms, possession, high self-esteem	Un-relaxing, busy, sign of workaholic, symbol of jealousy, stubbornness Envy, inexperience, money, greed
BLUE	Freedom, liberation, open-mind, free spirit, breezy, genial, responsibility, compassion, authority, loyalty, quite, dependable, self-expressive, confident, clean, aqueous, humid, pride, prestigious, elitist, cool, refreshing, heaven, wet, ice, hope, peace, relaxation, peace, tranquility, contentment, gratification imagination, fantasy, sensitivity, creativeness, spiritual or idealistic motivations *Tends to be the most preferred color universally (cross culturally).	Narcissism, conceit, somber, aloof, conservative
PURPLE	Royalty, mystical, charming, delicate, nostalgia, enigmatic, artistic, highly creative. sensitive, intimacy, union, enchantment, the blurring of thought, desire and reality.	Mourning, melancholy, endurance, penitence, intrigue

(cont. on next page)

Table 4. (cont.)

PINK	Feminine, sweet, tender, fun, romance, delicacy, refinement, and tenderness, attention-getting, passion tempered with purity.	Cloying, overly sweet, cheap
BROWN	Earthy, dependable, steady, stability, security, masculine, chocolate, autumn, sunset, family, home, calmness, familiarity, warm and welcoming	Dirty, boring, decay, rusting, decayed

Silver, which is associated with technology has become the most popular vehicle color choice worldwide for six years. The mind thinks of silver as a precious metal, like gold, but more attainable (WEB_25 2006). But in the automobile market the increasing acceptance of bright yellow and orange, shows the move toward mass personalization. And as smaller, more efficient vehicles gain market share, the need for colors that stand out will be demanded more. Consumers are more discriminating and their desire for color is increasing. They are proud of their vehicle choices and they want to be seen in distinctive colors. This is especially true for younger consumers. Today's youth is less rule-bound than their parents and grandparents. For them, fun equals vibrant colors and capturing attention.

Öksüz gives application examples of colors on product ranges (Öksüz 2004):

> Because of the eye-catching property of red, it stimulates activity and energy. It influences both sexes and all ages. Pink and peach are accepted as feminine colors. Hence, these pastel colors are the obvious choice for cosmetics. On the other hand, cleanliness and effectiveness associations of blue make it useful for detergent and face cleanser packaging and advertisements. Moreover, blue is the most preferred color in products for man on account of it's masculine property. Further, being recognized as a sign of safety and reliability, blue is utilized for both transportation and financial matters. Yellow, green and brown associate with natural and country-style, so they are preferred for natural foods and hand-made products. Many health products make good use of freshness of green and white. White is the widest color chosen for domestic appliances such as refrigerators, washing machines, dishwashers, kitchen robots for its association of cleanliness.

For contemporary design, iPod is the most popular product exemplifying the association of white with purity and simplicity. Famous for its purity and simplicity both in appearance and usage, iPod has been only white for long years. Jonathan Ive,

designer of iPod, defines the design perspective behind the product as “removing the unnecessary” (Bayley 2005).

Cultures and subsequently learned associations also affect color perception. For example it is widely known that black is the color associated with mourning in many Western countries. But in New Zealand, the color black, which has almost religious connotations symbolises passion, commitment and victory (Roberts 2004).

Some psychological associations and physiological reactions to color are universal. For example, red always provoke attention and named immediately after black and white in every spoken language. This psychological association of red is related to blood and fire, two significant elements to sustain life since the ancient times (Eiseman 2000). Basic color of the creation is red (Rhodes and Leon 2005): It symbolizes energy, vitality and martial power and association goes back to the primeval volcanic heat before the surface of the planet cooled and life took form.

People also respond colors physiologically (Çalışlar 2000):

> When the light hits the eye, it triggers reactions in the whole body. Feelings of excitement, depression, nervous reflexes show that liking or disliking something is a complex cerebral reaction involving our body and soul as a whole, not only a simple aesthetic evaluation. Robert Gerard projected red, blue and white pictures on a screen. He then measured the reactions of those participating to the experiment by keeping track of their blood pressure, stimulation of the nervous system, breathing, muscular tension, beating of eyelids. Usually the results are just as expected: nervous people are disturbed by red and their blood pressure rises. Blue makes them calmer. The brain reacts noticeably to bright colors (red, blue, white) and its activity increases more when the person is exposed to red than when he or she is exposed to blue. Colors and light can make people more extrovert. In well-lit spaces with warm colors people are more awake, interested, are in a better mood and more dexterous.

In addition, age, gender and ethnicity play a role on color tastes. Two months old infants prefer colorful objects to non-colorful ones (Eiseman 2000). Young children are drawn towards color more than form. They are color dominant. Generally as they grow up, children become more form dominant however many creative people leave color dominant through their lives. Childhood memories have a part in people’s responses to specific colors positively or negatively. Color looks less bright to older people, so they gravitate to white and bright tones (Solomon and Rabolt 2004).

3.3.3.4. Review of the Subject

Form, material and color are powerful factors influencing emotions and thus decision making. Role of these fundamental design elements related to emotional attributes of products can be divided into two groups. First one is the psychological and physiological response to form, material and color, which are partly universal and partly subjective. The subjectivity depends on personal experiences, ethnicity, culture, geography, age and gender. Second one is the impact of form, material and color on self-image of the consumer through fashion, trends and zeitgeist of the times.

Fashion and period have important effect on the aesthetic judgments of people. And while internet is bringing the world into daily lives of people with an increasing, seemingly unstoppable power personal tastes and choices no more depend merely on local or national trends. Global fashion is reaching and affecting every one in this age. Additionally to the deliberate fashion acts, by the means of communication age, all cultures and ethnical values are exhibited to the people. A person can start his/her trend of form, material and color by inspiring from something across the world. Thus aesthetic likings are open to quick but unforeseen changes.

Under these conditions, a designer should pay attention to two issues: A designer should consider the psychological and physiological association of form, material and color in order to reach a harmony with product's appearance in the eye of the consumer. This is a vital act to communicate the product (such as colors symbolizing product ranges, warning signs etc) and create a joyful user experience. Second is the awareness of trends related to the zeitgeist. This information is vital to understand the tendency people represent to express themselves in a particular period of time. A designer should have the skill to apply these data of form, material and color by considering age, gender, ethnicity and cultural differences for the target group of the product to catch the mood of the user – especially for the trend driven social groups like pre-adolescence and young adolescence, as well.

CHAPTER 4

CONCLUSION

Products, as well as other objects and artifacts, evoke emotions in people. The facts and scientific findings show the indispensable nature of emotion for a person. Emotions affect a person's decisions, social relations, communication and well-being in an incontrovertible way. Since products are objects people choose and experience emotions determine significant parts of that evaluation, choice and experience.

Emotional attributes of a product play an important role upon the purchase decision of the user and the product experience, which is vital to long-term use of a product. Investigations showed that first impression of products are very important due to fast operating nature of emotional system.

Although irrational aspects of a design do not directly concern an artifact's utility or purpose, they strongly influence how it is experienced and used.

Richard Buchanan defines emotion as 'the capability of having a feeling aroused to the point of awareness turning into a powerful product and leads people to the possibility of making decisions. When people powerfully express their emotions, they gain dignity and freedom of action.

Emotional attributes have always been part of the products. The affluence in product shapes and ranges proves this suggestion. When the history of products is observed it is clearly seen that people have always tried to differentiate themselves and express their personalities, status or beliefs through the products they have used. That is the primary reason of such an affluence of products: Human desire and imagination to build various types and styles of life. Also the presence of the artistry and search for aesthetics in the products of the past, as well as today, is another sign of such tendency.

Today, people demand pleasing, desirable, inspiring and beautiful, emotionally more satisfying, products day by day. The major reason is the fact that technological and functional qualities of the products from the different regions of the world are becoming similar. Therefore product quality is weakening as a differentiator for purchase decision. Consumers move towards the products that offer them emotional pleasure.

Frustration and the stress caused by the products are not always results of ergonomic problems or other traditional quality flaws. Generally the product lacks the proper communication to convey its assets and way of use. In these situations people react products in a negative way such as shouting at them or damaging them.

That is the point where emotional attributes of a product gain importance. Emotions are essential elements of communication between people and people express emotion through behavior. Since communication and social relations between people strongly pass through emotions the media a product can favor in order to improve product-user communication is emotions.

To sum up, emotional design concept argues that a successful design is linked to emotions as well as ergonomics, functionality and performance. In other words, properly added emotional attributes to design contribute to the success of the product. Thesis's view is, simply, that successful products are the ones, which convey product assets – innovation, proper function, usability, etc. – properly to the user profile selected in a meaningful and pleasing way.

Aesthetics is one of the major domains housing the emotional attributes of a product. Thesis defense that aesthetics do not have to be used or regarded as make up for two reasons. With its nature of appealing to emotions, aesthetic objects please human beings. Such a pleasure is a valuable reason to start and continue a relationship. This is a tool for giving communication ability to the product. Furthermore aesthetic values of a product are one of the important elements that make a product meaningful. Meaningfulness provides motivation to engage and cope with the product, which in the end improve product performance in user perception.

Researchers have always pursued to resolve the personal tastes and aesthetic preferences of consumers. Emotional design concept builds base to new perspectives and innovative studies like PrEmo. PrEmo is a self running instrument, operated on a display. PrEmo was designed to measure product emotions and reduce the difficulties of verbal description listed below to minimum:

- Sometimes people cannot express correctly what they want.
- Cultural differences may lead ambiguous expressions.
- Lack of proper vocabulary.

When the project is reviewed it is seen that in addition to the benefits listed above, PrEmo has another yield. PrEmo is eliminating an experiment conductor, a person who is generally assessed by people participating such experiments as a watchman.

Employing an experiment conductor may cause flawed survey results for two reasons. The conductor may lead or direct the participants subconsciously due to the temporary 'subordinate-superior' nature of the survey.

The other reason is the possibility of perceiving the conductor as a watchman. This virtual but effective pressure lead participants, in a subconscious manner, to behave as expected from them to be seen 'normal'. Participants' tendency to draw a 'normal' portrait manipulates their responses and answers in a nonfactual way.

By eliminating a conductor, PrEmo also eliminates such a virtual pressure and flawed, unhealthy and incorrect focus group surveys. PrEmo contributes to the collection of more accurate and healthy survey results.

The two design projects based on traditions in emotion research provided significant insight about design and emotions.

'Learning to Talk with Your Body' project showed that movements itself could motivate people emotionally as claimed by Jamesian tradition of emotion research. Test results revealed that the appearance of a product implicitly creates an expectation of the way it should be moved to use and operate, and what character or quality of this movement will be. This concludes two things:

- The first impression created by the form of a product affects user not only about the purchase decision. The body of the product communicates to the user.
- Study also exemplified that deliberate emotions can be designed into products. With a proper expectation/form relation, emotions designed into product form could facilitate use by directing users through the impressions generated by design.

The potential of emotional design to lead new perspectives is apparent in this project too. Different than general object design projects, 'Learning to Talk with Your Body' project focused on the dynamic qualities of the design rather than the static ones. Designers aimed to allow a dynamic interaction with the users in a humanlike frame through the form. Starting from this point, designers made close observations on human bodily and dynamic emotional expressions in order to mimic them through design. This brought a use of color and materials as significantly as form itself: The use of bright and

contrasting colors such as red green and purple; artificial, hard, cold and shiny materials like fake leather in the design of Anger.

Project indicated that for a successful emotional design, a detailed observation of the subject especially from a communication and interaction perspective is a must. A point worth to emphasise is the advantage of simple inferences reflecting daily associations users are familiar with like the key sentences generated to facilitate the design: “Sadness is indifferent to manipulation”.

‘Learning to Talk with Your Body’ project is an example of emotional attributes utilised for educational purposes. This approach can be employed in a broader application area for the educational and adaptational studies of the disabled or special people like the autistic.

Like ‘Learning to Talk with Your Body’ project, ‘Emotionally Intelligent Alarm Clock’ project proved that designing a product to affect daily experiences significantly through emotions and enhance user product interaction is possible.

More, ‘Emotionally Intelligent Alarm Clock’ showed that, besides evoking predetermined emotions, products can be designed to recognise, respond and adapt to complex emotional experiences and preferences of user like the waking experience.

In the design phase, designers avoided attributing human forms or other human characteristics (anthropomorphic qualities) to the product. Because improper or excess use of anthropomorphic qualities was known to cause anthropomorphic distraction that lead frustration and violence when products malfunction. Instead, designers chose a design-driven approach favoring ‘interaction with the product’ to detect emotion. The approach anticipates that the product senses user emotions from the way he/she uses the product while the user interacts with the product to set the alarm.

To understand the daily experiences of the users, designers run detailed observations. Participants were encouraged and directed to express themselves in informal but intuitive ways like a diary, an audio recorder, a disposable camera or a family tree (to investigate the desired personality of future intelligent alarm clocks by the means of photographs). Afterwards designers used this data to empathy with the users.

Emotional attributes are useful to invite users interact with the product continuously causing a long-term use. In this case, this goal was pursued through pleasure of playing with sliders and related alarm sound of next morning. Preventing product boredom will decrease consumption depending on obsoleteness created by

advertising to increase the sales. Major consequences of decrease in consumption will be a decrease in exploitation of natural resources and re-adjustment of spare financial resources of industry and household to other subjects like social and educational issues.

Patterns of the sliders will reflect the influence of user's emotion on the behavior that led to this wake up time. Then the user will have an opportunity to reflect on his/her emotional state. Such a way of reminding emotions may lead the awareness Buchanan stated.

Lastly 'Emotional Alarm Clock' project is a successful example of bringing user and technology together. The high technology used to recognise and adapt to the user emotions has been concealed behind the sliders: A simple, basic and easy to use operating structure.

The common point of the two projects is the need for close observation of routines of users, the ways they behave, move, experience and interact with objects, products and their environment. To seeing a user in a holistic structure, within a framework of a relational environment rather than evaluating isolated performances in isolated activities will give a better understanding of user emotions. Within this perspective, a designer should also utilise his/her intuition and senses to empathise the users.

Emotional design concept provides and demands new design tools and methods, to support a designer to design an emotionally valuable product-user relationship.

As products become more intelligent and adaptive, communication with them becomes more complex. Communication that will be established through emotions can be utilised to overcome this problem.

Products that establish emotional bonds with users and provide pleasurable interactions strengthen the brand. Such an effect should be employed with responsibility. Because by using such tools consumption – which is already at a dangerously high level – can be increased more. Such an increase does not turn healthy results when the scare resources and environmental pollution are considered. But the power of emotional bonding can be used to design and produce products of longevity in order to slow down consumption.

Furthermore by using Buchanan's emotion definition as a point of awareness, emotions can be used to elevate users to a level of awareness concerning crucial issues such as social or environmental problems.

Emotions can be used to help designers address the object not only as something useful that works according to particular rules but also as a meaningful image that encompasses sensory qualities and personal meanings. Meaningfulness raises the user motivation to interact and cope with the product and therefore product performance is increased.

Form, material and color are powerful factors influencing emotions and in the end decision making and product experience. Emotional attributes of form, material and color can be divided into two groups. First one is the psychological and physiological which are partly universal and partly subjective. The subjectivity depends on personal experiences, ethnicity, culture, geography, age and gender. Second one is the impact of these three fundamental design elements on self-image of the consumer in relation with fashion, trends and zeitgeist of the times.

It is necessary for a designer to know and investigate the relation between aesthetics, design elements and emotions at a scientific level.

A designer should consider the psychological and physiological association of form, material and color in order to reach a product harmony in the perception of the consumer. This is a vital act to communicate the product and create a joyful user experience. Second is the awareness of fashion and trends related to zeitgeist. A designer should continually be in touch with his/her age in order to address to users of the same period. This information is vital to understand the tendency people present to express themselves in a particular period of time. A designer must have the skill to apply these data by considering age, gender, ethnicity and cultural differences for the target group of the product to catch the mood of the user – especially for the trend driven social groups like pre-adolescence and young adolescence, as well.

To reach successful emotional designs, designers should explore and test the ways people live and communicate. Give emphasis to the center of society as much as laboratory and provoke users to express their thoughts, feelings and dreams.

With the findings of science about emotion and aesthetics, function should be redefined to include pleasure and joy.

With emotionally rich products, designers can provide users enriched experiences. This situation will go beyond user satisfaction but contribute to the welfare of the user as a human too.

Thesis had started with a suggestion that product design can enrich life; achieve higher user satisfaction, product longevity and a better use through emotions. At the end of the thesis it can be briefly concluded that thesis has reached its aim at an acceptable validity.

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