

**AN EXAMINATION OF POSSIBLE CONTRIBUTIONS OF NEW MEDIA  
TERMS AND CONCEPTS TO THE FIELD OF PRODUCT DESIGN**

**A THESIS SUBMITTED TO  
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES  
OF  
MIDDLE EAST TECHNICAL UNIVERSITY**

**BY**

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**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR  
THE DEGREE OF MASTER OF SCIENCE  
IN  
INDUSTRIAL DESIGN**

**SEPTEMBER 2005**

Approval of the Graduate School of Natural and Applied Sciences

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## **ABSTRACT**

### **AN EXAMINATION OF POSSIBLE CONTRIBUTIONS OF NEW MEDIA TERMS AND CONCEPTS TO THE FIELD OF PRODUCT DESIGN**

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September 2005, 105 pages

New media offer new ways for communication and production. This study aims to explore possible outcomes of the review of the new media literature for a contribution to the field of product design. Examining new media in a descriptive manner, the study presents its basic principles and characteristics. Relevant parts of new media and product design literature are reviewed in order to locate possible connections and/or exchanges between major concepts used in these fields. The two focal points of the study are the transformations that have taken place in (1) user-product communication and (2) design and production media, resulting from the emergence of new media technologies.

**Keywords:** New Media, Electronic Media, Media Technology, Digitalization, Product Semantics, Product Design

## ÖZ

### YENİ MEDYALAR TERİM VE KAVRAMLARININ ÜRÜN TASARIMI ALANINA KATKILARI ÜZERİNE BİR İNCELEME

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Eylül 2005, 105 sayfa

Yeni medyalar iletişim ve üretim için yeni yollar önermektedir. Bu çalışma yeni medyalar yazınının incelenmesinin olası sonuçlarının ürün tasarımı alanına katkılarını araştırmayı amaçlamaktadır. Yeni medyalar üzerine yapılan inceleme betimleyici bir yaklaşımla yürütülmüştür, yeni medyaların temel prensipleri ve özellikleri çalışılmıştır. Yeni medyalar ve ürün tasarımı alanlarında paralel olarak yürütülen bu yazın incelemesi sırasında bu iki alanın kavramları arasındaki olası bağlantılar araştırılmış ve irdelenmiştir. Yeni medyalar teknolojilerinin ortaya çıkışına bağlı olarak ürün ve kullanıcı arasındaki iletişimin dönüşümü ve tasarım ve üretim medyalarının dönüşümleri çalışmanın iki odak noktasıdır.

Anahtar Kelimeler: Yeni Medyalar, Elektronik Medyalar, Medya Teknolojileri, Sayısallaştırma, Ürün Anlambilimi, Ürün Tasarımı

## ACKNOWLEDGEMENTS

I would like to take this opportunity to express my sincere appreciation in advance to my supervisor Dr. Aren Kurtgözü for his continued guidance, very supportive advice, constructive criticism, ceaseless encouragement and enlightening insight throughout the whole research.

I wish to express my deepest gratitude for Assoc. Prof. Dr. Güven İncirliođlu for his ideas, helpful remarks on this thesis study and his utmost support coupled with knowledgeable advisory through the period I have carried out my post graduate study. I would also like to thank heartily to xurban.net members and Assoc. Prof. Andreas Treske for introducing me to the subject and keeping my focus on this direction.

The logistic and the morale support by my sister Esra and her beloved husband Cem throughout this study is also thankfully acknowledged. Moreover, I am indebted to my friends at METU and my colleagues in the office and Elif Tüfek for not only their support but also for their tolerance.

Lastly, to my dad İbrahim Akın whom I lost fourteen years ago, to my mom İlhan Akın and my grandma Muazzez Akın who has been holding up since then, I would like to thank for the financial support and endless encouragement they provided, but more for their faith that routed me to undertake further studies in the academy.

*In the beginning was the word and the word was God and the word was flesh ...  
human flesh ... In the beginning of writing.*

*William S. Burroughs*

## TABLE OF CONTENTS

<b>ABSTRACT</b> .....	<b>iv</b>
<b>ÖZ</b> .....	<b>v</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>vi</b>
<b>TABLE OF CONTENTS</b> .....	<b>viii</b>
<b>LIST OF FIGURES</b> .....	<b>x</b>
<b>LIST OF TABLES</b> .....	<b>xii</b>
<b>CHAPTERS</b>	
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1. Problem Definition.....	1
1.2. Aim of The Study.....	9
1.3. Methodology.....	11
1.4. Structure of the Thesis .....	11
<b>2. WHAT IS NEW MEDIA?</b> .....	<b>13</b>
2.1. Definition of New Media .....	13
2.2. Computer as a Meta-Medium .....	15
2.3. Principles of New Media.....	18
2.3.1. Numerical Representation .....	18
2.3.2. Modularity .....	19
2.3.3. Automation .....	21
2.3.4. Variability .....	22
2.3.5. Transcoding .....	24
2.4. History of New Media.....	25
2.4.1. Scientific History .....	26
2.4.2. Institutional History of New Media .....	28
2.5. Terms and Related Concepts .....	30
2.5.1. Interface .....	31
2.5.2. Multimedia.....	32
2.5.3. Interactivity .....	33
2.5.4. ‘As-If’ .....	35
2.5.5. Media Games .....	36
<b>3. NEW MEDIA, CYBERNETICS AND TRANSFORMATION IN PRODUCT SEMANTICS</b> .....	<b>38</b>
3.1. Cybernetics and Cyberculture as a Cultural Field of Research .....	39
3.1.1. Cybernetics .....	39
3.1.2. Cyberculture.....	41
3.2. Tools and Body Extensions .....	43
3.2.1. Tools .....	43
3.2.2. Body Extension .....	45
3.2. Cyborgs .....	53



3.3.1. Cyborgs as a Sociological Extension .....	54
3.3.2. Cyborgization in Movie Industry .....	55
3.3.3. Cyborgs with the Idea of Restructured Users .....	56
3.4. New Cultural Objects .....	57
3.4.1. New Cultural Objects as Body Extensions .....	61
3.4.2. New Cultural Objects with Interactive Qualities .....	62
3.4.3. New Cultural Objects with Immersive Qualities .....	66
3.5. Transformation in Product Semantics .....	67
<b>4. NEW MEDIA AS DESIGN AND PRODUCTION MEDIA .....</b>	<b>71</b>
4.1. Visualisation and Formal Impact .....	73
4.1.1. Dynamic Form .....	74
4.1.2. Principle of Variability in Production .....	74
4.2. Real-Time Testing and Integration of Design and Production Media .....	75
4.3. Database and Logic of Selection .....	79
4.3. Hayles' Approach - Media-specific Analysis .....	82
<b>5. CONCLUSION AND DISCUSSION .....</b>	<b>86</b>
<b>REFERENCES .....</b>	<b>94</b>
<b>APPENDIX A .....</b>	<b>99</b>
<b>PRESS RELEASE FOR APPLE IPOD .....</b>	<b>99</b>
<b>APPENDIX B.....</b>	<b>103</b>
<b>PRESS RELEASE FOR SONY WALKMAN .....</b>	<b>103</b>

## LIST OF FIGURES

### FIGURES

<b>Figure 1.1</b> Screenshot from the Kunsthhaus Graz design process (Source: <a href="http://www.kunsthhausgraz.at">www.kunsthhausgraz.at</a> ).....	6
<b>Figure 1.2</b> Kunsthhaus at Graz (Source: author’s personal archive).....	6
<b>Figure 3.1</b> Rebecca Horn, Finger Gloves, 1972, Performance photograph (Source: <a href="http://www.medienkunstznetz.de">www.medienkunstznetz.de</a> ).....	47
<b>Figure 3.2</b> Rebecca Horn, Berlin Exercises in Nine Pieces-Exercise 3: Feathers Dancing On Shoulders, 1974 – 1975, Performance photograph (Source: <a href="http://www.medienkunstznetz.de">www.medienkunstznetz.de</a> ).....	47
<b>Figure 3.3</b> Performance photograph (Source: <a href="http://www.medienkunstznetz.de">www.medienkunstznetz.de</a> ).....	48
<b>Figure 3.4</b> Man with C-LEG (Source: <a href="http://www.wired.com">www.wired.com</a> ). ....	51
<b>Figure 3.5</b> C-LEG (Source: <a href="http://www.wired.com">www.wired.com</a> ).....	51
<b>Figure 3.6</b> A scene from the movie ‘Existenz’ – “Bioport” (Source: <a href="http://www.darkhorizons.com">www.darkhorizons.com</a> ).....	55
<b>Figure 3.7</b> Woman, using headset (Source: <a href="http://www.vodafone.com">www.vodafone.com</a> ).....	62
<b>Figure 3.8</b> Mobile complementary accessories (Source: <a href="http://www.vodafone.com">www.vodafone.com</a> )....	62
<b>Figure 3.9</b> Sony Walkman, 1979 (Source: <a href="http://www.sony.com">www.sony.com</a> ). ....	63
<b>Figure 3.10</b> Apple iPod (Source: <a href="http://www.apple.com">www.apple.com</a> ).....	63
<b>Figure 3.11</b> Knob of a conventional Hi-Fi system (Source: <a href="http://www.marantz.com">www.marantz.com</a> )....	64
<b>Figure 3.12</b> Scroll-wheel of iPod (Source: <a href="http://www.apple.com">www.apple.com</a> ).....	64

<b>Figure 4.1</b> Screenshot from the interface of 3D Studio Max, Material library (Source: Screenshot by Refik Burak Atatür).....	80
<b>Figure 4.2</b> Screenshot from the interface of 3D Studio Max, Material mapping applied (Source: Screenshot by Refik Burak Atatür).....	80
<b>Figure 4.3</b> Screenshot from the techno-text named ‘Lexia to Perplexia’ by Talan Memcott (Source: <a href="http://iasl.uni-muenchen.de/links/TippMemmotte.html">http://iasl.uni-muenchen.de/links/TippMemmotte.html</a> ).....	85
<b>Figure 4.4</b> Screenshot from the techno-text named ‘Lexia to Perplexia’ by Talan Memcott (Source: <a href="http://iasl.uni-muenchen.de/links/TippMemmotte.html">http://iasl.uni-muenchen.de/links/TippMemmotte.html</a> ).....	85

## LIST OF TABLES

### TABLES

<b>Table 3.1</b> Contrasting Features of Industrial and Post-industrial Design (Source: Diani 1992, 6).....	58
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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1. Problem Definition**

The main goal of this thesis is to explore the possibilities in order to extend the new media terms and concepts into the domain of design literature.

New media technologies offer dramatic new ways for developing and expressing ideas. Information need not be constrained to a particular medium, but can flourish in dynamic and multiple media. Moreover, media themselves become modes of engagement - association and interaction are easier than ever. In parallel, concerning product design as a discipline of inscription of meaning, which uses various media for the expression and inscription of meaning, it becomes obvious that it is one of the most effected fields due to this transformation of media. Just at this point, the necessity to extend the new media terms and concepts into the domain of design literature arises.

The framework of the study is to be built concerning the possible communication media regarding product and user. The analysis of these media can be developed through three different perspectives. First, inspired by the basic product semantics studies, which dictates that a communication medium is indispensable in between product and user. The analysis of medium employed by product may be regarded as the second approach. Even though the first and the second perspectives are intricately related to each other, the idea and necessity to analyse them separately has become apparent in the course of the study of interface, which will be scrutinised in

detail afterwards. The third and the last approach is motivated by the notion of media-specific analysis offered by Hayles, which will be further analysed. In general, in practical terms emergence and availability of digital design, production and representation technologies will be scrutinized and discussed.

Many discussions are being held in the field of art and many art historians and art critics have difficulty to categorise this new phenomenon called new media and its products. At this point Manovich's seminal work, "The Language of The New media" and many articles and discussions, is found valuable and unique due to the effort that he shows to theorize this new phenomenon both in terms of building a new terminology and articulating this terminology with other fields like cultural studies, art history, cinema and design history. He defines this effort as an attempt at both recording and a theorizing of the present. Due to his education in former Soviet Union both on computer science and fine arts he may be regarded as the artist-scientist in resemblance to the great master of the Renaissance, Leonardo Da Vinci. Lately he has been teaching in Visual Arts Department, University of California, San Diego.

In order to clarify the terms of new media, media definition and history should be reviewed briefly, especially the media technology related to art and design. The term "media" here and in the rest of this thesis study is used as the plural form of the word "medium" instead of its secondary meaning according to Oxford dictionary, "mass communications". Medium is the means to convey a message, etymologically it is the term used for the people who convey messages from the dead. In The Oxford English Dictionary, the closest entry is as follows: "that by which something is expressed".

However, the endeavour to clarify a definition for new media is the method to find the possible extensions of this new occurrence. It is necessary at this point, at least to clarify, what new media is in general terms, with reference to its significant differences with 'old media'. Manovich lists these occurrences, mostly with reference to the characteristics of old media, as follows:

1. New media is analog media converted to a digital representation. In contrast to analog media, which is continuous, digitally encoded media is discrete.
2. All digital media (text, still images, visual or audio time data, shapes, 3D spaces) share the same digital code. This allows different media types to be displayed using one machine, i.e., a computer, which acts as a multimedia display device.
3. New media allows for random access. In contrast to film or videotape, which store data sequentially, computer storage devices make possible to access any data element equally fast.
4. Digitization involves inevitable loss of information. In contrast to an analog representation, a digitally encoded representation contains a fixed amount of information.
5. In contrast to analog media where each successive copy loses quality, digitally encoded media can be copied endlessly without degradation.
6. New media is interactive. In contrast to traditional media where the order of presentation was fixed, the user can now interact with a media object. In the process of interaction the user can choose which elements to display or which paths to follow, thus generating a unique work. Thus the user becomes the co-author of the work. (Manovich 2001, 49)

Analog media here refers to media that employs a variable physical quantity such as voltage to represent data. Digitization converts continuous data into a numerical representation. This method consists of two steps: sampling and quantization. First, data is sampled, usually at regular intervals, such as the grid of pixels used to represent a digital image. Technically, a sample is defined as “a measurement made at a particular instant in space and time, according to a specified procedure.” (Manovich 2001). The frequency of sampling is referred to as resolution. Sampling turns continuous data into discrete data. This data may occur in various distinct units like people, pages, pixels etc. Second, each sample is quantified, i.e. assigned a numerical value drawn from a defined range (such as 0-255 in the case of a 8-bit greyscale image).

As Manovich puts it, new media calls for a new stage in media theory whose beginnings can be traced back to the revolutionary works of Harold Innis in the 1950's and Marshall McLuhan in the 1960's (Manovich 2001).

It may take a few decades or even longer for this new technology which is making an important contribution to modern culture to “make it” into museums, books and other official registers of cultural memory. It is obvious that very few theoretical sources are found concerning the new media as a concept in the context of design. In order to reason the necessity of articulation of the issue of new media in design context, the observation by Schwarz should be noted:

We are faced today with a close-knit network of electronic media based on digital technology. This includes a fusion of reproduction and production technologies and, therefore, a union of reality and fiction. It is precisely in this large area – of the fragile union of reality and fiction – that the new media technologies create a new area of activity, which holds new meaning and experiences in store for us all (Schwarz 1997, 15).

With the advance and availability of new media technologies in various fields, art and design too have undergone a serious of changes both in the mode of production and the product itself. “The medium, or process, of our time – electric technology – is reshaping and restructuring patterns of social interdependence and every aspect of our personal life.” (Mc Luhan 1964)

The medium used for the production, including the design processes of the product, inevitably affects the meaning of that product. This meaning, as stated by Mc Luhan, cannot be detached from the media of production and representation and also from the media it employs to function. The way of production and design also shifted towards new media with the advance and availability of new media technologies. For example even though, a PC simulates almost every medium precisely and gently and behaves as a meta-medium; using a digital text editor is not the same thing as writing on an analog typewriter. This example will be further analysed through the scope of



Hayles' famous book titled "Writing Machines" on the activity of writing and on literature and how it has changed with the emergence of digital technologies. Hayles investigates the effects of new media technologies on literature using the method named as "media-specific analysis". This kind of a methodology for analysis of art and design practices under the influence of new media technologies would be useful. Also, via reading the book as a research concentrated on the efficiency of medium, it is possible to find various analogies between the ways and extents that new media technologies affect writing and design.

Peter Dormer has explained the relationship between design and technology, in the broadest sense, as follows:

The relationship between design and technology is not one sided. Technological developments do not determine what the manufacturer wants to produce, nor do they rigidly determine the shapes a designer creates. (Dormer, 1993, 42)

From the designers' point of view this shift occurs both in terms of hands-on operations like sketching, modelling, testing and at the same time in terms of decision making process. Modelling and illustration software like Discreet 3D Max or Adobe Photoshop already replaced paper and charcoal. This shift in the design process can be examined in three main phases, not necessarily in a chronological order: Visualisation, production and logic of selection.

Visualization here refers to presentation, shaping, styling or more in common terms, three-dimensional sketching in the product design process. It is possible to find many examples both in the field of architecture and industrial design that employed digital production techniques, using its different potentials like sketching complex geometric forms that can hardly be visualised non-algorithmically. One of the recent examples from architecture may be Kunsthaus in Graz, an art museum designed by Peter Cook and Colin Fournier, in southern Austria. Its form is inspired by the mesh techniques using a 3D modelling program.

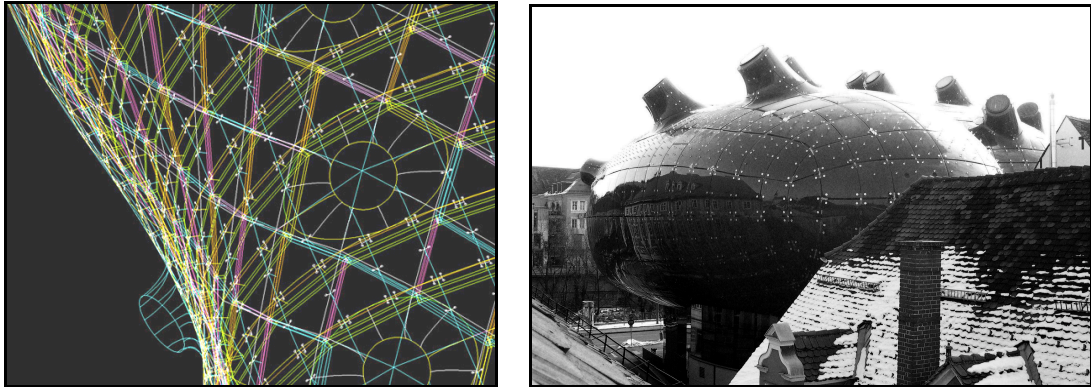


Figure 1.1 (left) Screenshot from the Kunsthaus Graz design process (Source: [www.kunsthausegraz.at](http://www.kunsthausegraz.at)).

Figure 1.2 (right) Kunsthaus Graz (Source: author's personal archive).

Production, including both prototyping and the production of the designed product, is the other phase in design process seriously affected by this shift. The exclusive change in the production regarding the design process is the availability of real time production or rapid prototyping techniques like three-dimensional printers or more precisely modelling machines. CNC is one of the most popular systems for real time computer controlled prototyping and production. The acronym CNC stands for Computer(ized) Numerical(ly) Control(led), and refers specifically to the computer control of machine tools for the purpose of (repeatedly) manufacturing, sculpting complex parts in metal as well as other materials, using a software. The MIT Servomechanisms Laboratory has developed a CNC system in the early 1950's. CNC machines were relatively briefly preceded by the less advanced NC, or Numerical(ly) Control(led), machines. These developments regarding the design and production media also enabled the production of complex sand molds and cores. Real time virtual testing environments for the products is a supportive development for this real time production mode. As mentioned by Dormer, "The influence of computer-aided design, computer-aided manufacture (CAD-CAM) is getting stronger by the year. One of the most interesting developments is computer animation which, when added to computer simulation programmes, allows a designer-engineer to see what the effects of wear and tear and time will have on a design" (Dormer 1993).

The decision making phase in the design process is also affected by the modular working logic of these software, like logic of selection from a database. The logic of selection, as stated by Manovich, that is selecting from a library or menu of predefined elements or choices, is a key operation for both professional producers of new media and end users (Manovich 2001). Here this operation can be exemplified in terms of computer programs employed in design process. Selection logic works with the availability of the object libraries included in these programs. For example, when a designer is engaged with designing any kind of three dimensional product, he/she is capable of choosing pre drawn 3D objects from the library as well as drawing a new, unique one, a graphic designer may use clip arts, pre-packaged artwork, available on graphics or desktop publishing software, for use in documents produced on computer. These object libraries are both offered by the owner and the developer firm of that software and by the professional cyber communities. This new behaviour action has also some cultural results regarding design literature, and will be detailed with the guide of the database culture concept in Chapter 4.

Another important effect of the emergence of new media technologies is the employment of media technological applications on the products, or in other terms the production and designation of products to serve as the extensions of the new media. These products will be noted as “new cultural objects” a term used by Manovich in his introductory article titled “New media from Borges to HTML” (Noah and Montfort, 2003) commissioned for the book “The New media Reader”. New cultural objects like cell phones, game consoles, mp3 players, even houses of today, a.k.a. smart houses, need an interface to communicate with the user. The level of interaction of the product design has shifted from a tangible medium to a virtual medium. Lately the term interface is being used for the “human computer interface”, instead of the tangible qualities and forms of a cultural object that communicate its mode of operation. These ‘new cultural objects’ are the concern of this study due the media that they employ to communicate with their user.

At this point, a brief literature survey on semantics, especially product semantics, is required to be included in this thesis study, since one of the main concerns of the

study is to explore the transformation in the way designed products communicate with their users under the influence of emerging new media technologies. Krippendorff and Butter define product semantics as follows:

Product semantics is the study of the symbolic qualities of man-made forms in the context of their use and the application of this knowledge to industrial design. (Krippendorff and Butter 1984, 4)

Product semantics is a subject of consideration based on the suggestion that a product's form should easily communicate the function of the product. To survey the principles of product semantics, a handle should look like, and feel like something that is to be held in hand and turned pulled etc., a knob should be something to be twisted, and a button should obviously be pushable by a finger, or hand etc. In other words “product semantics deals with the study of meanings, but as they are but as they are communicated in manufactured objects.” (Giard 1989)

The ways that the user makes use of a tool change as the medium of communication between the product and the user changes. Tracking these changes, it may be observed that product semantics in design literature also changes meaning or it may even become obsolete by the cancellation of intentional communication between the user and the product.

Certain literature related with the subject is based on perception, especially visual perception and the effects of the emergence of the new media technologies on perceptual processes. It is a commonly attended issue that the sensations can be stimulated by synaesthesia, and such concepts as interactivity, immersion, virtual reality concerning new media deeply, may have the same effect like another sensory organ to stimulate the perception. In the light of these discussions concerning stimulation of senses via multimedia applications, this area is also found to be a valuable research subject in the context of this study.

The new media theorists frequently employ archaeological methodology, in order to understand the origin and potentials and the meaning of the new media technologies, and these methods will be referred throughout the study, for example, in discussing virtual reality through panoramas. Panorama here stands for the pictorial illusions used to be constructed from the 17<sup>th</sup> century till recent days, for various purposes like education, propaganda or entertainment. Panorama is taken into account as the archaic form of virtual reality. The key concept that relates panorama and virtual reality is immersion, being involved deeply physically or mentally in what is presented. In this case, the panorama, with its unique spatial setting, encompasses the entire field of vision to act as an immersive environment. The term “archaeology”, instead of history, is being used for the methodology as a strategy, since archaeology basically deals with the material remains and using this term is a metaphoric action to take the concepts or the techniques to be discussed as an archaeological object. From another point of view, taking a concept like virtual reality (which was defined with the emergence of new media), as a cultural artefact, it is also possible to name this methodology as culture history, which is nothing but a type of archaeology. Clive Gamble in his book “Archaeology: The Basics” defines two types of archaeology: culture history and anthropological archaeology (Gamble 2003). This differentiation requires finding the underlying idea that makes us think that the older version of the same concept or an object, a form is the archaic form of the one that we are working on. Thinking on the panorama example again, in virtual reality, a panoramic view is joined by sensorimotor exploration of an image space that gives the impression of a “living” environment.

New media is a multidisciplinary and multi-perspective field. It is important to generate a shared understanding between different professionals of the phenomena related to new media.

## **1.2. Aim of The Study**

The aim of the study, in general, is to provide an academic ground of discussion in order to define and trace the significance of the phenomenon of new media in

relation to design processes, concepts and literature. In this respect, new media itself and various extensions of the issue in the context of design practice and literature, both in practical and metaphorical sense, will be discussed in detail.

In particular, the study focuses on the potential associations between new media and design via various propositions, most of them based on the book titled “The Language of the New media” by Lev Manovich (Manovich, 2001). By means of discussing and examining possible approaches to the issue, projections of these discussions in the domain of design will be explored.

Throughout this exploration, the areas where two distinct fields come closer or one procreate the other are valuable to come up with new ideas, or research methods for further studies. These new ideas or occurrences will be presented and discussed but more importantly, it is believed that media-specific studies will be more significant for all fields of research in the post industrialized world and especially for the field of design. The theoretical background and reasoning for this belief will be discussed in detail throughout the study, and depending on this theoretical reasoning, a crucial area of research for scrutinizing the relationship of design and technology will be surveyed.

As it is stated, literature in the field of product design interconnected with new media is scarce so, the research will be held by way of a lateral thinking, where lateral thinking may be defined as a technique of problem solving by approaching problems indirectly from diverse angles instead of concentrating on one, and this strategy may also be referred as a shortcoming of the study. Accepting this shortcoming for the study, lateral thinking provided a couple of new ideas emerging in parallel with terms and concepts introduced in the context of new media and they are presented throughout the study and more importantly it is thought that they are instrumental to introduce new research areas for the future studies.

Finally, the main objective of this study is to provide a new framework for the evaluation of designed products and the design processes by means of the medium and the technology employed. It is believed that the descriptive discussions around new media and its projections in design practice provide such a framework.

### **1.3. Methodology**

Due to its main goal, this research will mainly be based on a literature review among new media and product design and comparative readings and articulations will be employed where necessary.

‘Archaeological methodology’, as a borrowed set of means from Manovich and Grau, also had recourse to analyse and examine the new media objects and concepts instead of metaphoric analysis.

For the purpose of clarifying the domain and the opportunities offered by new media, art scene, in particular media art scene and recent projects related with the subject in the last fifty years will be one of the main fields of research. Many media art museums especially across Europe, their exhibition catalogues and the papers written by the art critics, exhibitions and museums are the documentary material needed for this research.

### **1.4. Structure of the Thesis**

Chapter 2 will include an elaborative research on the definition, principles, history and terms of new media. Descriptive approach will provide the framework to make further analysis in the context. The historical analysis will be carried out in two different aspects: first scientific history and second, institutional history. Scientific approach will provide the vision to understand the essence of reasoning behind the media technological developments. Institutional history will mainly cover the reflections of these developments especially in the field of art. The terms and

concepts related to new media which are going to be used frequently throughout the thesis will be defined and potential associations with product design literature will be discussed.

Third chapter will focus mainly on cybernetics and product semantics. It also includes a brief discussion on cyberculture, which is a cultural field of research in the age of cybernation. The relationship between the cybernetics and product semantics will be presented via cyborgs and new cultural objects. A brief literature review on cyborgs and an extensive definition for new cultural objects, with reference to designers and theoreticians will be given in this chapter. This chapter will also include a comparative survey between Sony Walkman and Apple iPod to further explore the possibilities of using new media terms instead of product semantics. Finally in this chapter, discussing the observations of the comparative survey on Apple iPod and Sony Walkman and other discussions held in the context of product semantics in terms of new media will enable us to come up with an idea for the future of the products semantics studies.

In the fourth chapter new media will be handled as design and production media. The effects of emerging new media technologies on design practice will be discussed in formal, cultural and economical aspects. Another important issue, which will be discussed throughout this chapter, is the importance of media-specific analysis for design and production. This term will be introduced with reference to Hayles and results of her analysis on literary studies will be projected to the field of product design.

The final chapter will include the conclusions and discussions in the light of the articulations held in all through the thesis and possible areas for future studies will also be mentioned.



## **CHAPTER 2**

### **WHAT IS NEW MEDIA?**

Throughout this chapter definition of new media and the examination of its context, conditions and tools will be studied. Principles of new media, its history by way of two different approaches, terms and related concepts will be investigated.

#### **2.1. Definition of New Media**

With the emergence and the availability of new media technologies and its main constituent, digital media technology, it is necessary to draw the borders of their domains. What follows is an attempt to discuss the history, definition and the context of this phenomenon called the new media. This attempt is useful, when it is done with reference to other media of representation and production via archaeological methodology or to scientific, historical, technological relations in between, since it is known that, “the content of a medium is always another medium” (McLuhan 1964, 151). In other words it is inevitable to include “old” media history in the context of new media history.

Before going into the details to define new media, it is necessary to express and explain the slight differences between the terms electronic media, computer-based media and multimedia since they were and will be referred frequently all throughout the study. Electronic media are those communication devices or tools, which are based on electronic or electromechanical means of production and communication and most often distinguished from print media. According to Manovich:

All electronic media technologies of the nineteenth and twentieth century are based on modifying a signal by passing it through various filters. These include technologies for real-time communication such as telephone; broadcasting technologies used for mass distribution of media products such as radio and television; and technologies to synthesize media, such as video and audio synthesizers, which originate with the instrument designed by Theremin<sup>1</sup> in 1920. (Manovich 2001, 126)

Computer-based media is employed as the electronic media based on digital technology. When computer-based media is referred it is not necessarily about a desktop computer. Any kind of digital application like ATM machines or MP3 players or an authoring software falls under this category. This is important since many applications embedded with the new cultural objects will be examined with reference to this term.

Multimedia, in brief, is the keyword for describing the integration of several media or telecommunication services within a single user interface like image, music, text etc. Since it is one of the key concepts in the field of new media especially concerning the new cultural objects, its definition will be further detailed later in this chapter.

A research question regarding this chapter is already succinctly proposed by Manovich: “If we are to construct an archaeology which will connect new computer-based techniques of media creation with previous techniques of representation and simulation, where should we locate the essential historical breaks?” (Manovich 2001, 16)

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<sup>1</sup> Theremin is one of the earliest fully electronic musical instruments. Invented in 1919 by Russian Lev Sergeivitch Termen. The Theremin is unique in that it requires no physical contact in order to produce music and was, in fact, the first musical instrument designed to be played without being touched. The instrument consists of a box with two projecting radio antennas around which the user moves his or her hands to play.

In many sources regarding the issue, the discussions are based on the categories which are commonly discussed under this topic in popular press: Internet, Web sites, multimedia, computer games, other media games, CD-ROMs, DVD, and virtual reality. This approach is inefficient in two points. First, these categories need a larger context to be discussed or to be articulated, rather than the context that they create merely by their existence. Second, this approach neglects the effect of the medium of production of the product. In this type of a definition, the products seem to be categorised, regardless of their production method and medium. They are kept out of the context to be discussed in terms of new media, like television programs, which are shot on digital video and edited on computer workstations, feature films, which use 3D animation and digital compositing. In other words, popular definition of new media identifies it with the use of a computer for distribution and representation, rather than with production. Especially the second inefficiency of this approach cannot be accepted in this thesis study, since one of the main objectives of the research is to investigate the effects of the medium-related reallocation of production in the context of art and design practice. In order to avoid these two shortcomings, it is useful to examine technological history as mentioned before, and to use means of archaeological methodology for the media technologies and try to set not some absolute laws, but the general tendencies of a culture undergoing computerization.

## **2.2. Computer as a Meta-Medium**

Manovich states that to understand the logic of new media we need to turn to computer science. It is there that we may expect to find the new terms, categories, and operations that characterize media that became programmable (Manovich 2001). Computers, more precisely personal computers, are the leading actors of the change in the media technologies related to art and design practice as in many other fields. Today perhaps we would not need to think about the relationship between art and technology if there were only mainframe computers with a capacity relevant for large businesses, municipal administrations and metropolitan telephone exchanges (Schwarz 1997). Motivated with these ideas, digital media, also as the main

constituent of the new media, will be discussed in detail both by means of production media and tools, and as a medium by itself.

The roots of the modern computer may be traced back to the Abacus, an ancient device used in China and other countries to perform arithmetic problems, which can be used to add, subtract, multiply, and divide, and to calculate square roots and cube roots. The Abacus consists of a frame containing columns of beads. In the 19<sup>th</sup> century most remarkable development was the invention of analytic engine by Charles Babbage and his patroness Augusto Ada. Although the ‘Analytical Engine’ was never built, its key concepts, such as the capacity to store instructions, the use of punched cards as a primitive memory, and the ability to print, can be found in many modern computers. In 1945, John von Neumann designed the now customary architecture of sequential but microsecond-fast computers for the planned American uranium bomb whose rate of explosion set new standards in the measurement of time. Neumann’s architecture postulated the following three system elements:

- Firstly, a central processing unit for command-controlled processing of alphanumeric data by either mathematical or logical rules;
- Secondly, a write-read memory for variable data and a read-only memory for programmed commands;
- Thirdly, a bus system for sequential transmission of all these data and commands as bi-univocally indicated through binary addresses by pages and columns. (Kittler 1996)

Even when the general model for a military purpose computer, which also establishes a model for the personal computer is proposed in 1945, computer based tools in our daily life has a history less then forty years. Machines that could dispense cash came into use in the late 1960's. Automated teller machines (ATM) were first introduced in the early 1970's. ATM is a computer terminal that functions as a miniature financial institution. ATMs enable people to make a variety of banking transactions any time. For example, a customer can use an ATM to make a bank deposit, withdraw a limited amount of cash, transfer funds between accounts, or get a cash advance on a credit card. Other important milestones of the history of

computer development may possibly be listed chronologically as follows: invention of first automatic calculator by Blaise Pascal in 1642, designation of the first mechanical computer, the analytical engine by Charles Babbage in 1830's, construction of first electronic special purpose electronic computer by John V. Atanasoff in 1939, invention of transistors in 1947 and the introduction of Altair in 1975 as the first personal computer.

In order to categorise or define the significance of digital media and the computers as a tool and medium by itself, a concept like meta-medium may be proposed. Alan Mathison Turing, who can be mentioned as the creator of the computer sciences, proved that the Universal Turing Machine<sup>2</sup> could simulate any calculating apparatus, including itself. In his time computers' calculating abilities were the main subjects of interest, but he already saw that an equally important quality was its ability for simulation. Even, by some authors like Kay and Goldberg, the computer is referred as the first meta-medium that has evolved. The computer as the first meta-medium, a medium to reinterpret and simulate previous media and create entirely new ones, provides a great vehicle for designing new media (Kay and Goldberg, 1977). An ordinary personal computer is nothing but a device, which simulates a medium, or a function of a tool usually with reference to its original. It does fit into a category of tools or conventional media neither before nor after its invention; that is to say, this meta-medium concept is not a chronological issue but an issue of understanding, defining the medium. Sometimes it is a typewriter; sometimes a HI-FI; sometimes a communication device; sometimes a TV; and sometimes a movie screen; etc. These examples may be broadened to almost every professional field of profession or to any medium of representation. This hyper and hybrid activity of the computers'

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<sup>2</sup> The concept of the Turing machine is based on the idea of a person executing a well-defined procedure by changing the contents of an infinite number of ordered paper sheets that can contain one of a finite set of symbols. The person needs to remember one of a finite set of states and the procedure is formulated in very basic steps for example, the following form: "If your state is 42 and the symbol you see is a '0' then replace this with a '1', remember the state 17, and go to the following sheet". Turing machines shouldn't be confused with the Turing test, Turing's attempt to capture the notion of artificial intelligence.

simulative character is the main motive to categorise it among non of the previous media but as a meta-medium.

### **2.3. Principles of New Media**

These basic principles are first offered by Manovich. They are listed and summarised as follows:

#### **2.3.1. Numerical Representation**

Manovich puts the very nature of this principle as follows:

All new media objects, whether they are created from scratch on computers or converted<sup>3</sup> from analog media sources, are composed of digital code; they are numerical representations (Manovich 2001, 27).

This has two key consequences one leading to the other. Firstly, a new media object can be described mathematically. For instance, a word, an image or a shape can be described using a mathematical function. Secondly, as an opportunity provided by the first one, the new media object is subject to algorithmic manipulation. For instance, by applying appropriate algorithms, we can automatically remove "noise" from a photograph, improve its contrast, locate the edges of the shapes, or change its proportions. This occurrence will also lead to the automation of many practices. In short, media becomes programmable. In this definition it should be noted that, while pointing at new media objects, the term stands for the general category of new media objects regardless of the production method.

As discussed in the Introduction, in order to convert a media object coming from analog media sources to a new media object, digitization is required. The first step of

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<sup>3</sup> Converting continuous data into a numerical representation is called digitization.

the digitization process is the sampling and sampling turns continuous data into discrete data. As a result a new media object consists of discrete data.

This nature of the new media objects is further scrutinised by Manovich with reference to Industrial Revolution along these lines:

Another possible reason, why modern media has discrete levels, is because it emerges during Industrial Revolution. In the nineteenth century, a new organization of production known as factory system gradually replaced artisan labour. It reached its classical form when Henry Ford installed first assembly line in his factory in 1913. The assembly line relied on two principles. The first was standardization of parts, already employed in the production of military uniforms in the nineteenth century. The second, newer principle, was the separation of the production process into a set of repetitive, sequential, and simple activities that could be executed by workers who did not have to master the entire process and could be easily replaced (Manovich 2001, 29).

Another useful aspect of the structure of new media objects made up of discrete units may be fixed with reference to Barthes. As Roland Barthes has put it, “language is, as it were, that which divides reality (for instance the continuous spectrum of the colours is verbally reduced) to a series of discontinuous terms” (Barthes 1968, 64). This is the key assumption of modern semiotics, that communication requires discrete units. Without discrete units, there is no language. Digitization basically, is nothing but to convert continuous data into a discrete form. This form enables the communication of the object with other objects and media. Old media like video or film also has some discrete parts like scan lines or frames but the particularity the new media, is that the discrete units of a medium are usually not the units of meanings, yet they are not analogous to morphemes<sup>4</sup>.

### **2.3.2. Modularity**

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<sup>4</sup> Oxford dictionary definition of morpheme is, smallest meaningful part into which a word can be divided.

This principle can be called "fractal structure of new media." (Manovich 2001, 30) Analogous to a fractal having the same structure on different scales, a new media object has the same modular structure throughout. New media objects like images, sounds, shapes, or software codes, are represented as collections of discrete samples (pixels, polygons, voxels<sup>5</sup>, characters, scripts). These samples are assembled into larger-scale objects but they continue to maintain their separate identity. Also at the same time as put by Manovich; "The objects themselves can be combined into even larger objects -- again, without losing their independence." (Manovich 2001, 31). This independence has some exceptions regarding the perception. A counter example for this principle of modularity may be given. When a web page is displayed on a browser, a photograph on the page is seen and perceived separately from its background but as a file in the operating system of the computer, it may include the background as well. This is nothing but a selective perception created by the browser. No matter how the principle of modularity dictates the independence of objects, like images, animation or movies, this independence may alternate between perception and the real application. In general this selective perception created by the browsers can be further clarified with the introduction of Netomat browser, which extracts elements of a particular media type from different Web pages (for instance, only images) and display them together without identifying original locations on World Wide Web.

Another characteristic of the modularity principle can be investigated through the concept of structural computer programming. Structural computer programming has become a standard since 1970s. It involves writing small and self-sufficient modules (called in different computer languages subroutines, functions, procedures, scripts), which are assembled into larger programs. Many new media objects are in fact computer programs, which follow structural programming style. For example, most interactive multimedia applications are programs written in Macromedia Flash's Action Script. An Action Script program defines scripts, which control various repeated or looped behaviours, such as clicking on a button; these scripts are assembled into larger scripts. The main result of this structure, similar to the nature

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<sup>5</sup> Voxel is, analogous to a pixel, is the smallest unit of a volume to represent it digitally.



of old media, is that when a part is deleted or damaged in such a program the whole thing may change or lose meaning.

### **2.3.3. Automation**

The possibility of numerical representation of the media and the modular structure of a media object allow the automation of many operations involved in media creation, manipulation and access. Thus human intentionality can be removed from the creative process, at least in part. For example Adobe Photoshop, being an image processing software, which is built with strong references to a conventional darkroom, may automate some operations like adjusting the brightness/contrast of a photograph even without displaying it to the author of the photograph (here user of the software is regarded as the author of the photograph as well).

Manovich investigates automation in two main groups. “Low-level” automation is defined as the automation of media creation, in which the computer user modifies or creates from scratch a media object using templates or simple algorithms. For example, 3D graphics, word processing, graphic layout, and so on. The Photoshop example given in the previous paragraph fits into this category. “High-level” automation, an important concern in this context, will be extended till the automation of design. Another important aspect of “high-level” automation of media creation which requires a computer to understand, is to a certain degree, the meanings embedded in the objects being generated, i.e. their semantics. This research on “high-level” automation can be seen as a part of a larger initiative of artificial intelligence (AI). As it is well known, AI project achieved only very limited success since its beginnings in the 1950s. Manovich mentions this aspect as follows:

Correspondingly, work on media generation, which requires understanding of semantics, is also in the research stage and is rarely included in commercial software. Beginning in the 1970s, computers were often used to generate poetry and fiction. In the 1990s, the users of Internet chat rooms became familiar with bots -- the computer programs, which simulate human conversation (Manovich 2001, 33).

The concept of automation is related with the shift of the level of design of a product. Human effort and interference on design process has changed its position. With the availability of automation where the human factor is removed from the creative process, in order to be the author of designed object, say, it is necessary to author the software or the machine in general that runs the automation employed in the design process. In the article titled “Generation Flash” Manovich, in short, states that the artist of the future is not the one using the software but the one designing the software. When certain decision-making activities in the creative course of action are left to the software (even if it is a learning machine equipped with artificial intelligence technology) the main creative activity is to set the parameters and the methods to be employed and used by the machine.

The parameters to be used by the machine, which will automatically design, may be grouped in three as the feed parameters, methodological parameters and the output parameters. This is nothing but the model of a conventional production engineering system. Various decisions are to be made by the designer of such a system like, who and how will feed the input to the system, what kind of pre-set rules will work and in what tolerance the user can modify them during the process and how and to which context will the output be delivered.

#### **2.3.4. Variability**

“A new media object is not something fixed once and for all but can exist in different, potentially infinite, versions.” (Manovich 2001, 36) This is another consequence of numerical coding of media and modular structure of a new media object. The terms “mutable” and “liquid” may also be valid to use instead of the term “variable” in this context. Manovich explains this principle with reference to old media as follows:

Old media involved a human creator who manually assembled textual, visual and/or audio elements into a particular composition or a sequence. This sequence was stored in some material, its order determined once and for all. Numerous copies could be run off from the master copy, and, in perfect correspondence with the logic of an industrial society, they were all identical. New media, in contrast, is characterized by variability. Instead of identical copies a new media object typically gives rise to many different versions. And rather than being created completely by a human author, these versions are often in part automatically assembled by a computer. (Manovich 2001, 37)

Web pages (Netomat Browser) automatically generate layouts from databases using the templates designed by web designers, thus the already mentioned example of automation can be called upon for this principle as well. Accordingly the principle of variability is closely connected to automation.

As one proceeds through the principles, the relationships between them become clearer, and Manovich states yet another:

Variability would also not be possible without modularity. Stored digitally, rather than in some fixed medium, media elements maintain their separate identity and can be assembled into numerous sequences under program control. (Manovich 2001, 36)

In addition, Manovich explains, “Since the elements themselves are broken into discrete samples (for instance, an image is represented as an array of pixels), they can be also created and customized on the fly.” (Manovich 2001, 36).

There may be some specific cases of this variability principle such as media database. A variety of end-user objects which vary both in resolution, in form and in content can be generated, either beforehand, or on demand, from this database. In the computer age database comes to function as a cultural form of its own. It offers a particular model of the world and of the human experience. It also affects how the

user, who is the designer or the artist in our case, conceives data, which the database contains. For example the trademark of a clipart database affects the approach of the graphic designer who is to use this database. The media database inevitably carries cultural meanings not only due its contents but also due its origin, trademark, previous users or creators.

### **2.3.5. Transcoding**

The principles investigated up to now, numeric coding and modular organization, may be regarded as the “material” principles of new media. Automation and variability are the extensions of these material principles.

The last and fifth principle offered by Manovich is transcoding. It is the most abstract principle and it may find its roots deep in the philosophy history. On the other hand it finds provision in many daily cases. Manovich explains it as such:

The last, fifth principle of cultural transcoding aims to describe what in my view is the most substantial consequence of media’s computerization. As I have suggested, computerization turns media into computer data. While from one point of view computerized media still displays structural organization which makes sense to its human users — images feature recognizable objects; text files consist from grammatical sentences; virtual spaces are defined along the familiar Cartesian coordinate system; and so on — from another point of view, its structure now follows the established conventions of computer's organization of data. The examples of these conventions are different data structures such as lists, records and arrays; the already mentioned substitution of all constants by variables; the separation between algorithms and data structures; and modularity. (Manovich 2001, 45)

Transcoding principle mainly refers to the meta-medium character of the computer. As argued before computer has the capability of simulating every medium perfectly. This simulation occurs through transcoding. Meaning of transcoding lies in the

difficulty to name a text on the computer screen as a text file (in computer language) or as a text (in human language). So the text or text file on the screen has two distinct realms. In one of them one can talk about its author, main idea, language, subject etc. and in the other realm one talks about its file size, file type, physical location on the disk etc.

To conclude with a brief definition, it can be stated that transcoding is the projection of the ontology of a computer onto culture itself.

#### **2.4. History of New Media**

Throughout the research on new media history, it is seen that the boundary between the media history and new media history is blurred or new media history is written with very strong references to media history. Various interesting approaches may be found to write the history of new media.

One approach is to accept that the concept of light and its tangible form (fire) as the core element, the medium to convey messages through a distance. Here, the examples may be broadened to the scientists who work on their own body being a light source, a radiant object in physical means. Of course this low frequency light cannot be perceived with the naked human eye. Another challenge by means of communicating with the light was to try to develop a language written on fire by using physico-chemical ways. Following this track will lead us to today's modern monitors, which convey messages on nothing else but light. Of course the main concepts that have been used by the visual art historians and theoreticians is the main motive to make the new media definition based on the light. Even theorists like Siegfried Zielinski offers to initiate the archaeology of the new media travelling to the east where the sun, the ultimate light source, arises.

In the context this study, two main approaches, which can be named as scientific history and institutional history, will be quite helpful. Scientific history goes parallel

with technological developments and it is possible to observe the changing trends in the media technologies due to scientific inventions. Institutional history mainly depends on the artistic projects throughout the media museums and other institutions such as schools and annual festivals, and more focused on the creative use of the media than the projection of scientific inventions.

#### **2.4.1. Scientific History**

The first approach to study the history of new media is to draw the outline of a scientific history of the media and try to find out the critical point where it became new. Friedrich Kittler in his article “The History of Communication Media” aims to draw an outline of scientific history of the media - an outline for the simple reason that media sciences is a new field of research which would not exist had it not been for the triumphal advance of modern information technologies. This is why such a history comes up against methodological and practical problems. Scientific history, accepting the existence of some exceptions, usually is parallel to chronological deviation of the metamorphosis. Metamorphosis here refers to the observable changes in media technologies through culture, products and ways of communication. Kittler elaborates the history of the media in two main categories as writing and technical media, and the digital technology as the last attempt of the technical media since the invention of Turing machine in 1936 by Alan Mathison Turing.

For Kittler, it is reasonable to conclude that the historical transition from oral to the written word corresponds to a decoupling of interaction and communication, and the transition from writing to the technical media indeed to the decoupling of communication and information. This is said to be an evolutionary process and further explained by Kittler as follows:

This evolutionary process gives us the possibility of dividing the history of communication media into two main blocks. The first block deals with the history of writing and itself

divides into a section on scripts and one on printing. The second block on technical media will take us from the basic invention of telegraphy via the analog media to, finally, the digital medium of the computer. (Kittler 1996)

Kittler examines the first block, history of writing, in two main historical categories: script and printing. Printing here chronologically falls into the time of Gutenberg's invention of printing press using movable type developed from book-spine stamps which, in contrast to their predecessors in China and Korea, functioned both alphabetically and (after the disappearance of ligatures) discretely, and it may not have been a revolution of the magnitude of the codex - but met the demand awakened by paper.

The second block, technical media, is explained as following: "Unlike writing, technical media do not utilise the code of a workaday language. They make use of physical processes which are faster than human perception and are only at all susceptible of formulation in the code of modern mathematics." (Kittler 1996). Telegraph, telephone, film and gramophone are the examples discussed in this category, in a chronological order of their invention and conventional usage. Electronic technology is a transition period between analog technology and digital technology. The electrification of sensory input data through transducers and sensors enabled the entertainment industry to couple analog storage media first with one another and secondly with transmission media. Sound film, which combines optical and acoustic memories, is a good example of coupled technologies. All coupled technologies like, sound film, radio, television are already individually standardised, even though they developed their own aesthetic forms, but according to Kittler, have one decisive deficiency:

There is no general standard which regulates their control and reciprocal translation. This is precisely the point at which the heroes and heroines of (Walter) Benjamin's theory of media came to the rescue in the form of editors in film studios and sound engineers for tape with their celebrated but strictly manual montage techniques. The rendering obsolete of this human intervention and the automation of a general standard was reserved for digital technology (Kittler 1996).

Following this chronological track of Kittler's through scientific history of media in order to find the critical point where it became new, it can be seen that putting digital technology as the main constituent of new media, as done by Manovich, is not an oversight.

Kittler, through his track on the scientific history of media, claims that for multi-dimensional signal processing in real time, such as is required for television pictures or computer animations, the Neumann's architecture, mentioned in the introduction section, becomes a bottleneck. According to Kittler, the day is not far off when signal processing will reach the physical limits of feasibility. This absolute limit is where the history of communication technologies will literally come to an end in near future. Theoretically there remains only the question as to what logic this completion will have obeyed. From Freud to McLuhan the classical answer to this was a generic subject - humanity which before of an indifferent or interferent natural world would have externalised first its motor and sensory interface, and finally its intelligence, in technical prosthetics (Kittler 1996). This techno-historical approach will be useful in order to construct the theoretical background of the logic to define and design the new cultural objects as an extension of human body, different than a tool.

#### **2.4.2. Institutional History of New Media**

For new media, in order to make a historical study, institutions and media museums should be the main areas of focus where the most productive and documented activities take place.

The new media technologies, which are in the process of becoming the dominating economic and political force of the 21<sup>st</sup> century – which, as we know – started in 1989 if not earlier – are suddenly discovering the important role which art and artist could play in designing the new content and



reception forms without which their media merchandise would be of no market value (Schwarz 1997, 15).

Roy Ascott, the English pioneer of telematic<sup>6</sup> art, with his famous maxim, “New Art Needs New Venues”, has described the necessity of new institutions for new media. These venues appeared to be not only museums but also institutions to allow practical research and development appropriate for media engineering and to support its applications in an artistic and social environment.

The pioneer of these institutions can be cited as ZKM, which was founded in the year 1986.

ZKM is a multifaceted institute in Karlsruhe, Germany, that has ambitions to be the Bauhaus of the digital age. The Institute for Visual Media was created within ZKM specifically to establish a research and production environment for artists in which, they could critically work with the quickly developing technologies of electronic image reproduction (Schwarz 1997, 15).

The present director and founder, of the Institute for Visual Media, the Australian media artist Jeffrey Shaw, describes the perspectives of the Institute’s work as follows: “If one considers the vision which have accompanied the development of contemporary art in the last thirty years – kinetic art of the 1950’s the ‘open art work’ of the 1960’s (happenings, environments, performances, land art, etc.), the conceptual and socially critical art forms of the 1970’s – then one recognizes these visions display interesting and astonishing parallels to the technological developments of the nineties. Interactivity creates a close relationship between the work of art and the viewer, telecommunication makes far-reaching social interactions possible, and simulation endows conceptual ideas with a material form. It appears to be only a short step from ‘inter-media art’ to multimedia technology” (Schwarz 1996). Finally, Schwarz puts the vision of ZKM in brief as follows:

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<sup>6</sup> Telematic is, by definition something effective over a distance by means of telecommunication technology.

However, we cannot yet foresee whether technology will lead to fulfilment or to the final dissolution of the artistic Utopias. The Institute for Visual Media would like to be a place where artists can reflect on this question, and work on it. (Schwarz 1996)

SIGGRAPH in the U.S. and Ars Electronica in Austria have already been acting as annual festival places of artists working with computers since the late 1970s. The new media field began to take real shape only in the end of the 1980s. At the end of the 1990s new institutions devoted to the production and support for new media art are founded in Europe: ZKM in Karlsruhe (1989), New media Institute in Frankfurt (1990) and ISEA (Inter-Society for the Electronic Arts) in the Netherlands (1990). In 1990, Intercommunication Centre in Tokyo began its activities in new media art as well. Throughout the 1990s, Europe and Japan remained to be the best places to see new media work and to participate in high-level discussions of the new field. Festivals such as ISEA, Ars Electronica, DEAF have been required places of pilgrimage for interactive installation artists, computer musicians, choreographers working with computers, media curators, critics, and, since the mid 1990s, net artists.

## **2.5. Terms and Related Concepts**

Up to now, various approaches to new media, its basic principles and history have been investigated. Throughout this investigation it has been seen that the concepts like interface, interactivity, multimedia, and ‘as-if’ do not directly signify or totally represent the characteristics of the new media but they are the outcome of the working principles of the new media. Even though, they are frequently used in the context of new media, these concepts did not evolve with the emergence of the new media technologies. The computer designers (software designers) or the new media artists, product designers who deal with new cultural objects make use of these concepts and terms. These new cultural objects will be further examined in the following chapter but here it is essential to make clear these concepts and their modalities in the context.

### **2.5.1. Interface**

In general, an interface is the boundary along which two substances or other naturally different things meet; it is also used metaphorically for the juncture between items. For example in daily life, a steering wheel of a car can be named as the interface of a car or a public relations department of a company is the interface of the company. By definition, there is very slight difference between a medium and an interface. Assuming a case where two systems communicate, a medium belongs to both communicating systems where an interface belongs to one of the constituents of the communicators. In electronics and computer literature interface is used as a term that represents the physical boundary between two subsystems or devices. In computer sciences concerning human computer interaction (HCI) the computer and human is defined as two discreet systems and as stated by Manovich: “In semiotic terms, the computer interface acts as a code which carries cultural messages in a variety of media.” (Manovich 2001, 72). Throughout the study, the term interface will be used to hold for the meaning “user interface” which is the totality of means by which the users interact with a particular machine, device, or in short a tool. The user interface provides means of input and output where input allows the users to control the system and output allows the system to inform the users, which also can be referred to as feedback.

Another very common extensional usage for term “interface” is graphical user interface (GUI) usually in the realm of computer interfaces. “GUI, popularized by Macintosh, remained true to the modernist values of clarity and functionality. The user’s screen was ruled by strait lines and rectangular windows, which contained smaller rectangles of individual files arranged in a grid.” (Manovich 2001, 64). No matter how this kind of functional quality of this term seems to dominate the usage of interface, this study will mainly focus on the term “user interface”.

The design of a user interface affects the amount of effort that the user must spend to provide input for the system and to interpret the output of the system, and how much effort it takes to learn how to do this. This is the point where this term becomes

valuable in order to study the issues of product semantics and new media technologies.

### **2.5.2. Multimedia**

One of the possible ways to investigate the history of the new media, keeping in mind that the integration of media through art and design practice is one of the crucial issues to be discussed in the scope of this study, is to simultaneously examine the history of multimedia and new media in general.

Multimedia as a concept, which also can be seen as a milestone when offered by Vannevar Bush or one of the outcomes of the meta-medium disposition of the digital media, may be seen as a potential medium for the integration of art practices inspired by the famous concept offered by Richard Wagner in the late 19<sup>th</sup> century, “*gesamtkunstwerk*”, the total work of art. The total work of art is a concept offered (and also an *ecol * for opera) to combine poetry, music and drama with a perfectionist aesthetical understanding. There are two possible approaches to understand the notion of multimedia in this sense. In other terms, this broad definition may be examined from two different aspects.

As mentioned before computer is a simulation machine, in Kay’s words capable of being “all other media”, so it is quite reasonable to discuss a concept like multimedia in the realm of computers. Vannevar Bush, who come up with the notion of ‘memex’ in 1945 in his famous article “As We May Think”, an abbreviated word for the ‘memory extension’, thought that this notion will enhance the individual’s capability for creative thought and he proposed a machine with the same name which may be regarded as the ideal background of the today’s personal computers and the conception of multimedia.

Packer and Jordan introducing the suggestion of integration of arts with reference to *gesamtkunstwerk* reify the second approach to the issue, from an artistic point of

view. This idea is based on “to craft a medium that would appeal to all senses simultaneously – a medium that would mimic and enhance the creative capabilities of the human mind.” (Packer and Jordan 2001, xvi). They frame their theory as the “secret history” of multimedia as following:

Here, then, is a “secret history” of multimedia: a narrative that includes the pioneering activities of a diverse group of artists, scientists, poets, musicians, and theorists from Richard Wagner to Ivan Sutherland, from Vannevar Bush to Bill Viola (Packer and Jordan 2001, xvi).

Both of these approaches should be in the province of product design literature as well, in the time of multifunctional and perceptually stimulating artefacts. The first approach in order to define multimedia reifies in today’s multifunctional artefacts or gadgets where the second approach is the ideal background for the perceptually stimulating artefacts. These qualities of today’s artefacts will be analysed further in the next chapter.

### **2.5.3. Interactivity**

From a historical point of view, especially throughout media history, it can be thought that the multimedia required choices of the viewer so the concept of interactivity has evolved due this necessity after multimedia. But before going into the details it should be noted that interactivity is a mode of communication. As a matter of fact trying to define interactivity in the realm of computers results in a tautology since the computer itself is an interactive device. As stated by Manovich: “Once an object is represented in a computer, it automatically becomes interactive. Therefore, to call computer media “interactive” is meaningless -- it simply means stating the most basic fact about computers.” (Manovich, 2001, 55)

In classical communication theory medium is something, that by which the message is conveyed to its receiver from a sender. New media does not signify a single-sided type of message transfer as in classical communication theory. The feedback time for

the message decreases dramatically with the advance of interactive media technologies. In other words receiver is becoming the sender at the same time.

Another very important aspect of interactivity is AI (artificial intelligence), since it is fed by the interaction with the user. “Fuzzy logic”, dealing with the concept of “partial truth” is the essence of AI. Whereas classical logic holds that everything can be expressed in binary terms (0 or 1, black or white, yes or no), fuzzy logic replaces Boolean truth values with degrees of truth and it is used to program AI systems which depend on the information that comes from the user through interaction. So, to speak about the new cultural object that will learn about the user’s behaviour, it should be noted that the information flow would be through interaction, which is designed.

From a different point of view, necessity of interactive media in the field of art is explained by Manovich as follows:

Modern media and art pushed each of these techniques further, putting new cognitive and physical demands on the viewer. Beginning in the 1920s new narrative techniques such as film montage forced the audiences to quickly bridge mental gaps between unrelated images. New representational style of semi-abstractness which, along with photography, became the “international style” of modern visual culture, required the viewer to reconstruct the represented objects from the bare minimum -- a contour, few patches of colour, shadows cast by the objects not represented directly. Finally, in the 1960s, continuing where Futurism and Dada left off, new forms of art such as happenings, performance and installation turned art explicitly participational. This, according to some new media theorists, prepared the ground for interactive computer installations, which appeared in the 1980s (Manovich 2001, 56).

As traced through the art historical perspective drawn by Manovich, interactivity is employed in the field of art for the sake of new art forms. Increasing role of participation in the new art forms for the benefit of the effect of the art piece on the spectator was the main motive to employ interactive technologies, and it also

chronologically followed the developments of these technologies. In the field of design, especially considering the mass-produced consumer products it is hard to find approaches to the issue, until the emergence of the concept “Pleasurable Products”. Even though little attention is paid to this new phenomenon in the book by Patrick Jordan, titled “Designing Pleasurable Products” (Jordan 2000), it is limited in the context of ergonomics, usability and human computer interaction, which anyhow is nothing but an issue of interaction. Buchanan construes this occurrence as follows:

There is a common misunderstanding that interaction design is concerned fundamentally with the digital medium. It is true that the new digital products have helped designers focus on interaction and the experience of human beings as they use products. However, the concepts of interaction have deep roots in twentieth-century design thinking and have only recently emerged from the shadow of our preoccupation with “visual symbols” and “things.” (Buchanon 1999, 9)

However, Buchanan argues that new digital products have lead designers focus on interaction and the experience of human beings as they use products; it is still hard to find attitudes to employ this phenomenon in order to stimulate the effect of the product on the user. Today, with the emergence of new media technologies and as their result, new cultural objects, it is inevitable to articulate interactivity with product design, not only by means of usability and human computer interaction, but also as a central aspect of aesthetics and meaning of the product. In the following chapter, through comparative case studies of Sony Walkman and Apple iPod, the significance of interactivity in product design and possibility of interactivity as an aesthetic aspect will be explored.

#### **2.5.4. ‘As-If’**

The closest entry for ‘as-if’ in The Oxford Dictionary is as follows: “as would be the case of”. In the context of new media this term is often used in reference to simulation. Particularly it is used to describe the situation when simulation is in

progress. 'As-if' quality of an object is directly proportional to the illusory quality of the object. Grau make use of this concept in a discussion held in the context of virtual space, as follows:

In virtual space, both historically and in the present, the illusion works on two levels: first, there is the classic function of illusion, which is the playful conscious submission to appearance that is the aesthetic enjoyment of illusion. Second, by intensifying the suggestive image effects and through appearance, this can temporarily overwhelm perception of the difference between image space and reality. This suggestive power may, for a certain time, suspend the relationship between subject and object, and the 'as-if' may have effects on awareness (Grau 2003, 17).

#### **2.5.5. Media Games**

Media Games have a special role in the context of new media and are important for understanding the modalities of multimedia, interactivity, and the 'as-if' quality because combination of various terms and concepts may be observed in the structure of such games. Volker Graßmuck has expressed the common ground of (electronic) media and games in the following succinct way:

Primarily, both games and media obey internal rules, though the rules can refer to external objects. Both create an order, an arrangement, a style. For this reason both move within the sphere of aesthetics. Common to both is the fictional ('as-if') quality. What occurs is only game... (Schwarz 1996, 49).

This 'as-if' quality is closely related with the issue of the logic of design software. Media games aside, the 'as-if' quality is also a necessary constituent for most of the software, which are constructed with reference to their original mode of production. As exemplified before, Adobe Photoshop, a photo-editing programme, is nothing but a simulation of a conventional darkroom, that is to say, 'as-if' a darkroom.



Another reason to deal with media games is to understand the concept of interactivity predominantly employed by media games. Roger F. Malina, editor of journal “Leonardo”, the journal of the International Society for the Arts, Sciences and Technology, compiles five basic characteristics that do not necessarily allow one to develop evaluation criteria for interactive media art, but are suitable for determining its structure due to the fact that they are inevitably based on certain characteristics of computer. These characteristics are as follows:

1. Possibility of carrying out interaction in real time mode, which alters the internal status of the computer;
2. The computer’s capacity for having learning processes built in so that the internal status of the computer alters while interaction is taking place;
3. The possibility of linking up the computer with other computers over long distances via telecommunication networks;
4. The capability of incorporating and assimilating signals with a multitude of modes not all of which are accessible to the human senses, and link to these signals in a sensual, aesthetic way;
5. The capacity to store vast amounts of information, which can then be made easily available (Schwarz 1996, 50).

## CHAPTER 3

### NEW MEDIA, CYBERNETICS AND TRANSFORMATION IN PRODUCT SEMANTICS

*“After more than a century of electric technology, we have extended our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned. Rapidly, we approach the final phase of the extension of man – the technological simulation of consciousness, when the creative process of knowing will be collectively and corporately extended to the whole of human society, much as we have already extended our senses and our nerves by the various media. (McLuhan 1965)”*

This chapter will deal with, in brief, product semantics, interactivity between product and user, and the shift in the interface and the medium of this interaction with the advance of new media technologies, with reference to history of new media. This examination has the potential to result in a conclusion as an occurrence of the radical transformation of product semantics and intended interactivity of the designed product and its user. The term intended interactivity here stands for to represent the two-sided communication between product and user depending on tactile and visual codes of the product. Since scientific historical analysis of new media technologies promises a flesh-machine connection in the future and this is a potential medium for

the communication between man and machine, body extensions and cyborgs will fall into consideration. New cultural objects, defined previously in reference to Manovich, will be the domain for the case-specific analysis and the relation between the new cultural objects; computer-based media and computers will be examined. Another interesting point to observe throughout this chapter is the relation between the products equipped with computer-mediated technology and the computers, and also in between computers and computer applications.

The discussion held throughout this chapter will fit in a context defined by the first and second perspectives of the framework described in the Introduction.

In the first and the second chapters of this thesis various definitions for new media has been investigated, but it is essential at this point to make a definition of cyberculture and cybernetics.

### **3.1. Cybernetics and Cyberculture as a Cultural Field of Research**

Cybernetics and its extensions like cyberculture and cyborgs fall into consideration in the context of this thesis study for two main reasons. First, cyberculture is a new distinct field for design literature, inspired by cultural studies. Second, cybernetics, as an interdisciplinary science also dealing with the man-machine interactions, is a rich field of research to understand and to examine possible extensions of the relationship between human beings and products.

#### **3.1.1. Cybernetics**

The term cybernetics has its roots in the Greek word for *kubernetes* (steersman) or “governor”, and Norbert Wiener’s, use of it suggests how people interact with machines through a controlling device, such as a steering mechanism. Wiener is a mathematician, and electrical engineer and communication specialist, famous with his derivation of the word “cybernetics” together with Arturo Rosenbluth in 1948, in his book of the same title. According to his definition all activities like driving a car, passing through an automatic door, or clicking with the mouse are cybernetic

activities. Among Wiener's examples of cybernetic activities, the one that he refers to a car should be noted. This choice among various examples has a metaphorical value due the derivation of the word 'cybernetics' and will become more significant later on in this chapter with the example of technical connotation by Baudrillard with reference to French philosopher Gilbert Simondon. Wiener proposes that the man-machine interactions must be inspired by the human communication, in other words man-machine interfaces should have their roots in the human-human communication behaviours. His proposition is summarised in his words as the following:

It is my thesis that the physical functioning of the living individual and the operation of some of the newer communication machines are precisely parallel in their analogous attempts to control entropy through feedback. Both of them have sensory receptors as one stage in their cycle of operation: that is, in both of them there exist a special apparatus for collecting information from the outer world at low energy levels, and for making it available in the operation of the individual or of the machine. In both cases these external messages are not taken *neat*, but through the internal transforming powers of the apparatus, whether it be alive or dead. The information is then turned into a new form available for the further stages of performance. In both the animal and the machine this performance is made to be effective on the outer world. In both of them, their *performed* action on the outer world, and not merely their *intended* action, is reported back to the central regulatory apparatus. (Wiener 1954, 57-58)

His thesis, summarised above, establishes the theoretical background of the cybernetics studies of today.

Cybernetics today is an interdisciplinary science concerned with the investigation of control processes in biological, technical and social systems. Cybernetic systems are characterised by automatic control as well as transference, processing and re-transference of information. Today cybernetics is integrated into newly formed scientific areas such as information theory, communication, signal theory, system theory, artificial intelligence research and biological cybernetics (bionics) etc. All automatic data processing systems are cybernetic machines according to Wiener's definition. (Schwarz 1996)

Wiener's groundbreaking theory on cybernetics is valuable in the context of this study, since his theory became the main reference for anyone investigating the psychological and sociocultural implications of human-machine interaction, as stated by Jordan and Packer, "Wiener understood that the quality of our communication with machines affects the quality of our inner lives." (Packer and Jordan 2001).

### **3.1.2. Cyberculture**

As stated by Manovich, new media and cyberculture represent two distinct fields of research. But they inevitably have a common literature even when it can be argued that the cyberculture is a field of research within the field of new media. Cyberculture is a domain that usually employs networking technologies, although it does not deal with new cultural objects. The study of these objects is the domain of new media. Therefore it is suitable to investigate cyberculture and its extensions in design practice and literature in the scope of this thesis.

Basically cyberculture is a culture or society dominated by cybernation. Here cybernation means automation through the use of computers, although the dictionary definition of cybernation is 'the noun form of control by the machines'. Arguing the distinction between new media and cyberculture, Manovich defines cyberculture as follows:

I would define cyberculture as the study of various social phenomena associated with Internet and other new forms of network communication. Examples of what falls under cyberculture studies are online communities, online multi-player gaming, the issue of online identity, the sociology and the ethnography of email usage, cell phone usage in various communities; the issues of gender and ethnicity in Internet usage; and so on... Notice that the emphasis is on the social phenomena; cyberculture does not directly deal with new cultural objects enabled by network communication technologies. (Manovich 2003, 13)

Cyberculture, with the availability of the network technologies to the masses, is becoming a part of the mass media. It is different from the other mass media like

televisions, newspapers or Internet portals in one sense: It is user centred with the aid of network technologies. The term “user centred” does not stand for “user focused” or “customisable”, it defines a medium where the users themselves supply the information. Blogs are the lately emerging type of the cyberculture communities. The word blog is a combination of the word “web” and “log”. It has been the most searched word on an online dictionary of Merriam Webster ([www.merriam-webster.com](http://www.merriam-webster.com)) with a following meaning: “a web site that contains an online personal journal with reflections, comments, and often hyperlinks provided by the writer”. Blogs come in many different forms. Many act as news sites for particular groups or subjects, some are written from a particular political stand and others are simply lists of interesting sites.

Cyberculture provides a new identity for the users. A blog, a forum or some other kind of a network community defines a parallel universe potentially free of the rules dictated by the tangible life that we are living. So, this parallel universe is a potential place for a rebirth, construction of a brand new identity. This identity is so designed and real in the sense that it can be even exchanged as a commodity or a second hand identity. Nicknames and avatars are the new signs of the member of this community who will be mentioned as the spectator or the consumer later on in this chapter.

Avatars are the small icons representing the user of the cyber community with his/her nickname. Its dictionary definition is, an incarnation in human form or an embodiment (as of a concept or philosophy) often in a person or a variant phase or version of a continuing basic entity. In some antique Hindu religions like “Sanathana Dharma” avatar is the name and the identity of the God “Vishnu” at his last visit to earth in a human form. The term avatar especially in the cyberpunk literature is used to signify the whole identity created by the user.

Cyber communities have also begun to work as mass media networks with the emergence of news oriented blogs and the availability of the networking technologies to the masses. These facts place them into the category of mass media tools, which assures the ability of imposition of messages as much as the conventional mass media tools.

In the light of these discussions cyberculture may be employed in two ways in design literature. First, cultural background of the designed object may be inspired by these cyber identities, a study focused on the issue of identity and extended to cyber identity. Second, the cyber communities, which are today replacing conventional mass media networks like radio, television, newspapers etc., may be used for the cultural promotion of the designed product. Although both of these studies seem quite promising fields of research in order to articulate new media in the context of design literature, they are out of the scope of this thesis study since they need an extensive research in the context of cultural or media studies. So, for the rest of the study it is appropriate to focus on the cybernetics relying on Wiener's definition, which is mentioned above, and in this manner tools and their relationship with the human beings in the closest sense as body extensions fall into the scope of this discussion.

### **3.2. Tools and Body Extensions**

Motivated by the idea of investigating the gap (between a tool and a human) which is defined as the potential area of communication in the field of product semantics, tools fall into the scope of this study. With the intention of observing the metamorphosis of tools into body extensions due to medium they use to communicate with their users, and of the projection of this metamorphosis on to the design literature it is essential to make further analysis in this framework.

#### **3.2.1. Tools**

To design tools has always been a major task for a product designer. In The Oxford English Dictionary, the most suitable entry for "tool" in the context of this discussion is as follows: "Any device or implement used to carry out mechanical functions whether manually or by a machine." Pelle Ehn defines tools in a way discernible from other privileged humane instruments like our bodies, our language, our social institutions, in that they are designed, constructed maintained, and redesigned. In his book "Work-Oriented Design of Computer" in order to enter a discussion of how computer tools should be designed, or in other words what kind of

an approach makes a tool better he states that: “A good tool becomes an extension of our body.” (Ehn, Kyng 2003, 651). However, design of the computer environment is out of the context of the discussion held through this chapter, but “interactivity” as a keyword interrelates the concepts like product semantics, tool and body extension. Ehn puts his view on the subject as such:

In a way a tool perspective is just a special case of designing computer artefacts as interactive plays – a case where the first personness is carried out by a skilled tool user acting in a context of useful materials from which he or she can create good use quality products. It is a challenge to design, to create such tools for pleasurable engagement, tools that when used help the user transcend the boredom of machine work. (Ehn, Kyng 2003)

The case foreseen by Kittler when he mentions the externalization of human intelligence with technical prosthetics, it refers to the transmutation of tools to body extensions. This case leads to the loss of significance of human-product interaction, and thus a significant transformation in product semantics and also even to interactivity, in the sense used by Ehn. In such a case the new task of the designer is to design a human extension that will work mechanically, electronically or digitally, which is more than designing a tool. Furthermore, sometimes this extension is not anthropomorphic one but a brain-computer interface to be designed.

At this point it is necessary to go back and take a look at the product design history affected by the technological developments, i.e. progression of microelectronics, in order to be able to make a reference point regarding technological advances and design. The invention of microchip, a semi-conductor integrated circuit, was the foundation for microelectronics. Microelectronics has lead to the miniaturization of the working parts of electronic devices and in many cases the industrial products as well. According to Dormer, the designer has been affected by microelectronics in three ways, as follows:

1. Miniaturization of working parts has meant that an object can become smaller or that it can be turned into an object



of curiosity – the external form no longer having to follow the dictates of the internal workings.

2. Miniaturization has also, in some instances, ‘devalued’ the currency of certain goods – thus cheap, small radios and cheap, even smaller pocket calculators are approaching the status of the ballpoint pen in terms of availability and disposability. The designer is therefore no longer working on a precious object.
3. The third impact is upon the designer personally – the computing power of the new computers is challenging his or her skills (Dormer 1993).

Looking at the parallel history of technology and design, developing technology has always lead designers to design the products more suitable to the human body, ergonomically, even like an extension of it. This tendency has been described by Dormer, in 1996, in the early years of computer technology applied on the products, and in the heyday of miniaturization of electrical components. Small electrical components enable designers to design complex things to be held in the hand. “Gadgets thus become toylike” (Dormer 1993). After miniaturization, today with the availability of not only human-machine interaction but also flesh-machine connections, gadgets become the extension of the body, analogous to a cyborg. These gadgets may be examined in the category of medical prosthetics, wearable electronics or probably in the future just tools as body extensions. This issue is best studied in the field of cybernetics.

After this discussion on tools, motivated with the idea of tools as body extensions, in order to concentrate on the narrowing gap between the tool and the user it is appropriate to glance at the body extensions.

### **3.2.2. Body Extension**

Body extension in the philosophical sense is commonly discussed together with the notion of space. Sorabji refers to Aristotle:

Aristotle rejected the idea of 3-dimensional space as a redundant addition to the idea of a body's 3-dimensional volume or extension. A body's extension or volume is different from space, because it is mobile and moves with the body, whereas space is supposed to be immobile and to be left behind when the body moves on. But why, Aristotle asked, should you need to postulate so many 3-dimensional entities in the same place - both the extension of the body and the space the body occupies. The space is supposed to penetrate right through the body, but so is the body's extension: why postulate both? (Sorabji 2003)

As mentioned before the closing gap between the tool and the user brings out the idea of wearable electronics, especially when it is remembered that one of the main focuses of this study is to investigate the shift in the medium due to new media technologies, those that fill the mentioned gap. Before going into the definition and history of wearable electronics, deliberation on the issue of body extension is possible through two seemingly unrelated fields of study, which are art and medical prosthetics.

### **3.2.2.1. Body Extension in the Field of Art**

Body extensions, due to an endeavour to examine the limits of the human body since it is one of the main elements of nature according to humans, are the subject of interest of many contemporary artists like Rebecca Horn.

Rebecca Horn (1944), a German born artist is well known with her objects, actions, and performances, focused on the body and her performances are integrated early on into works for film and video.

While Rebecca Horn's more recent work has been determined by a poetical deployment of mechanical constructions, this object belongs to 'Performances II' (1973), a film in which Rebecca Horn was preoccupied still with extending her own body into space. Besides the 'Finger Gloves', body extensions also figured in the performances 'Einhorn' ('Unicorn'), 'Kopf-Extension' ('Head Extension'), 'Weißer Körperfächer' ('White

Body Fan'), 'Meine Hand kann fliegen' ('My Hand Can Fly'), 'Gavin', 'Hahnenmaske' (Cockfeather Mask'), 'Bleistiftmaske' (Pencil Mask') and 'Kakadu-Maske' ('Cockatoo Mask'). (Medienkunstnetz.de, Horn, 2005)



Figure 3.1 (left) Rebecca Horn, Finger Gloves, 1972, Performance photograph (Source: [www.medienkunstnetz.de](http://www.medienkunstnetz.de)).

Figure 3.2 (right) Rebecca Horn, Berlin Exercises in Nine Pieces-Exercise 3: Feathers Dancing On Shoulders, 1974 – 1975, Performance photograph (Source: [www.medienkunstnetz.de](http://www.medienkunstnetz.de)).

Her artistic series titled “Berlin Exercises in Nine Pieces” (1974) mostly deals with the possibility of extending the body into space as well as establishing a communication medium through body extensions with other objects.

Another important name in this context is Stelarc, an artist born in 1946 and based in Australia. His work explores and extends the concept of the body and its relationship with technology through human-machine interfaces incorporating medical imaging, prosthetics, robotics, VR systems and the Internet. One of his spectacular performances is titled “Fractal Flesh”. The performance is described on Medienkunstznet website as follows:

A body of FRACTAL FLESH, whose agency can be electronically extruded on the Net—from one body to another body elsewhere. Not as a kind of remote-control cyber-

Voodoo, but as the DISPLACING OF MOTIONS from one Net-connected physical body to another. Agency could be shared in the one body or in a multiplicity of bodies in an ELECTRONIC SPACE OF DISTRIBUTED INTELLIGENCE, a body with TELEMATIC SCALING OF THE SENSES, perceiving and operating beyond its biology and the local space and human scale it now occupies, a body remapped and reconfigured, a body directly wired into the Net, a body that manifests the statistical and collective data flow, as a socio-neural compression algorithm. A body whose proprioception responds not to its internal nervous system but to the external stimulation of globally connected computer networks. (Medienkunstznetz.de, Stelarc, 2005)

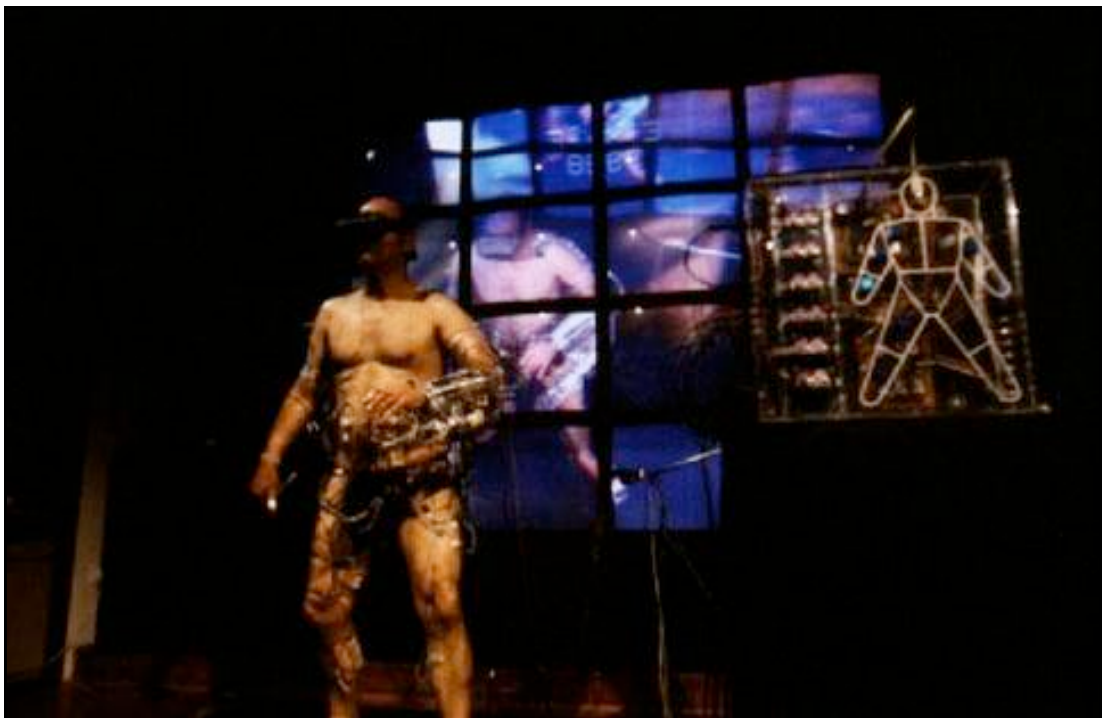


Figure 3.3 Stelarc, Fractal Flesh, 1996, Performance photograph (Source: [www.medienkunstznetz.de](http://www.medienkunstznetz.de)).

Endeavours of these kinds in the field of art practice lead to theoretical discussions around the issue of body extensions and embodiment. The approaches in these theoretical discussions may also be valuable in design literature. Katherine Hayles is one of the important thinkers/writers on the issue whose thoughts are valuable in the scope of this study. Hayles articulates body and its extensions accepting the shortcomings caused by the ignorance of the notion of space. She focuses on the changing embodied experiences through interaction, where she uses the term “information-rich environments” for the environment where this embodiment occurs

and she introduces the term “proprioception” to the domain of this discussion as such:

Consider first the force of habits to shape embodied responses, especially proprioception, that internal sense that gives us the feeling we <occupy> our bodies rather than merely possess them. Computer video game players testify to feeling they are projecting their proprioceptive sense into the simulated space of the game world. In fact, they eloquently insist that being a good player absolutely requires this kind of projection. Their body boundaries have fluidly intermingled with the technological affordances so that they feel the joystick as an unconscious extension of the hand. A related set of changes concerns the different ways in which their neural structures have evolved as a result of their extensive interactions with this technology. Of species on earth, humans are among those with the longest period of neotony, extending at least into adolescence the capacity of the nervous system to change and evolve after birth. The flexibility of the human neural system enables new synaptic connections to form in response to embodied interactions. (Hayles, 2003)

Proprioception, sensory awareness of the body is an important issue regarding the communication medium between the product and the user. Apparently it represents some other type of embodiment rather than the physical prosthetics like in the case of prosthetic limbs or organs, which will be discussed in detail in the next section.

Before going into further examination of medical prosthetics it should be clarified that these can be grouped in two main categories as: First, physical prosthetics for the physical function of a lost limb or organ. These may have their own processing units to function. Second, neural connected prosthetic especially developed for the benefit of paralysed people. In this case man-machine interface is constructed through brain-machine connection.

### 3.2.2.2. Medical Prosthetics

Initial applications of body extensions were made due to medical necessities. Prosthetic organs, i.e. the electronic eye or previously prosthetic legs or arms, which is nothing but a digital camera capable of sending signal of vision to brain, are the main examples of such extensions.

Probably one of the most important figures in mind while referring to the issue of medical prosthetics is Stephen Hawking, English physicist born in 1942. Most people recall him with his speech synthesiser. Hawking is probably the most famous computer mediated medical prosthetics user among masses. It is remembered that in one of his interviews on BBC television, he claims that he can better communicate in various ways than the time before he lost his speech.

Gareth Branwyn, a cyberculture writer, categorises the neural prosthetic and interface technologies of today in three major areas: auditory and visual prosthesis; functional neuromuscular stimulation (FNS); and prosthetic limb control via implanted neural interfaces, and further explains in detail:

So far, the most successful implants have been in the realm of hearing. Larry Orloff, a scientist who had suffered hearing loss since childhood, edits *Contact*, a newsletter for people with hearing implants. He reports that there are more than 7,000 people worldwide outfitted with cochlear implants. These devices work through tiny electrodes placed in the cochlea region of the inner ear to compensate for the lack of cochlear hair cells, which transduce sound waves into bioelectrical impulses in ears that function normally. Although current versions of these devices may not match the fidelity of normal ears, they have proven very useful. Dr. Terry Hambrecht, a chief researcher in neural prosthetics, reports in the *Annual Review of Biophysics and Bioengineering* (1979) that implanted patients had "significantly higher scores on tests of lipreading and recognition of environmental sounds, as well as increased intelligibility of some of the subjects' speech." (Branwyn, 1993)

One of the other recent examples is the C-LEG SYSTEM, which has been demonstrated in the Wired Magazine<sup>7</sup> with the title “Prosthetics Go Bionic” (Wired Ed., 2005). The C-Leg's microprocessor crunches data from internal sensors - which measure angle and force 50 times per second - then adjusts the limb as the wearer moves to keep motion fluid. The knee's stability makes it easy to negotiate uneven terrain.

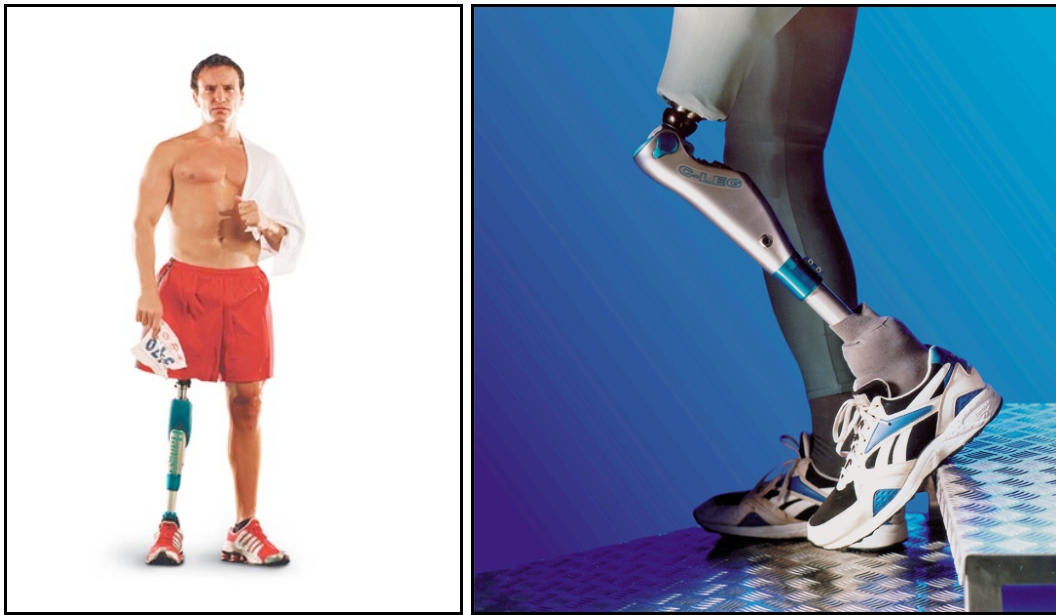


Figure 3.4 (left) Man with C-LEG (Source: [www.wired.com](http://www.wired.com)).

Figure 3.5 (right) C-LEG (Source: [www.wired.com](http://www.wired.com)).

### 3.2.2.3. Wearable Electronics

Depending on how broadly one defines both wearable and electronics, the first wearable electronics could be as early as the 1500s with the invention of the pocket watch or even the 1200s with the invention of eyeglasses.

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<sup>7</sup> Wired Magazine is an American monthly magazine, dedicated to media culture and technology and mostly interested in the reflection of these issues in various fields, as well as in business.

Even when an electronic watch may be regarded as the first wearable electronic invented, from a historical point of view, probably the most remarkable object in this category is Walkman. Walkman is not an invention like electronic watch solely imitating the function of a mechanical watch just changing the mechanism from mechanics to electronics but it is an invention of a function as well. As mentioned briefly in the second chapter, its invention and occurrence had been important concerning cultural aspects of design. Idea of mobility behind its design had been the main motive to design it like a body extension. Surrounding, isolating ambiance that it creates is the other feature of Walkman, that it can also be perceived as a body extension as well as a wearable electronic. With reference to these qualities of the product United States Patent Agency describes this object s follows:

An audio system for portable high fidelity reproduction, to provide a sensation of being surrounded by a three-dimensional field of lifelike sound events, comprises a set of miniaturized electro-acoustical devices adapted to each other and for battery-operated high fidelity reproductions and designed to be supported by or built into an interconnecting belt-like garment, so as to be worn in contact with the listener's body without causing any discomfort or encumbrance. The system may further employ one or more pairs of small-size binaural transducers with open-air high fidelity characteristics, and its circuitry is designed for binaural radiation and for optimal frequency response and perfect space reproduction through a given transducer type. (United States Patent Agency, 1983)

With the emergence and availability of digital technology wearable electronics had a new form as wearable computers.

A wearable computer is basically, a portable computing device, which is designed to be worn. Wearable computers are usually either integrated into the user's clothing or can be attached to the body through some other means, like a wristband. They may also be integrated into everyday objects that are constantly worn on the body, like a wristwatch or a hands-free cell phone.



Wearable computer design and development is an active topic of research among areas of studies like user interface design, augmented reality<sup>8</sup>, pattern recognition<sup>9</sup>, use of wearable computers for specific applications or disabilities, electronic textiles and fashion design. Many issues are common to the wearable computers, mobile computing and ubiquitous computing research communities, including power management and heat dissipation, software architectures, wireless and personal area networks and sensor networks.

After all these information and examination of approaches, it is clear that the amalgamation of tool and human in various fields depends on the similar ideas and it is multi-disciplinary subject of research. This kind of an approach to product design will be further scrutinized under the title of “new cultural objects as body extensions” for commenting on the communication medium between the human and the user.

The amalgamation of man and machine, in the extreme sense their embodiment, has found a new domain of discussion in the field of cybernetics.

### **3.2. Cyborgs**

Cyborg, an abbreviated name for a cybernetic bio-organism, is a human form, intimately linked to both the flesh and the mechanical, and best known for its hybrid character, which by constantly reshaping its own boundaries reshapes our own. Manfred Clynes is the founder of the term to be used in a NASA conference on modifying the human for living space in 1958. The first idea of creating a cyborg

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<sup>8</sup> Augmented reality (AR) is a field of computer research, which deals with the combination of real world and computer generated data. At present, most AR research is concerned with the use of live video imagery, which is digitally processed and "augmented" by the addition of computer generated graphics.

<sup>9</sup> Pattern recognition is a field within the area of machine learning and can be defined as "the act of taking in raw data and taking an action based on the category (layout, recurring pattern, shape, contour etc.) of the data".

depended on the necessity to modify a human with implants and drugs, who as such can exist in space without space suits.

Tracing the roots of the concept of cyborg idea back in history, it can be seen that the idea is not new as the term “cyborg”. Gray explains occurrence and the significance of the term “cyborg” as follows:

The term “cyborg” caught on, but not among scientists, who preferred more specific labels such as biotelemetry, human augmentation, human-machine systems, human-machine interfaces, teleoperators, and-to describe copying natural systems to create artificial ones – bionics. “Cyborg” took off among science fiction writers who had already recognized the incredible integration of technology into natural systems that was starting to transform the society. Cyborg is as specific, as general, as powerful, and as useless as a term as “tool” or “machine”. (Gray 2000, 19)

This linkage of flesh to machines may be categorised in two main types. First one is the physical extension of a body and the second one is the brain-computer interfaces. Brain computer interfaces is beyond the scope of this study since it is scientifically a very premature phenomenon and the literature found about it is not much than fantasies with the exception of early stage of applications.

### **3.3.1. Cyborgs as a Sociological Extension**

Dealing with the linkage of the human body with the machines requires the deconstruction of the body. This requirement is found quite valuable among the social researchers like Dona Haraway, since it is an opportunity to reinvent the identity of women as the borders between dichotomies get blurred during this deconstruction. Here, these dichotomies refer to binary oppositions in the context of feminist theory. Her book titled “Cyborgs and Women: The Reinvention of Nature”, deals with this issue through a feminist perspective. Her achievement is quite useful for understanding the nature of this phenomenon but also beyond the scope of this

study due to its specific emphasis. She defines a cyborg in her famous “Cyborg Manifesto” in 1991 as follows:

A cyborg is a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction. (Haraway, 2003)

### 3.3.2. Cyborgization in Movie Industry

Cyborgs also drew the attention of the moviemakers as well since the issue as a whole provides a good base for future prediction or creating a fantasy world. Especially the second type, which is brain-machine interface, is best known from the realm of science fiction.



Figure 3.6 A scene from the movie ‘Existenz’ (1999) – “Bioport” (Source: <http://www.darkhorizons.com>).

In popular movies like Johnny Mnemonic (1995), The Matrix (1999), or eXistenZ (1999) audiences have been confronted with representations of various artificial “sockets” either into the brain or the spine to upload memory (Johnny Mnemonic) or connect to the human mind to virtual reality (game) world (The Matrix, eXistenZ). In many science fiction novels, brain sockets are used to connect the human mind to a computer-generated environment. However, today these kind of applications may be possible but are not nearly as sophisticated as the imaginary ones in the science fiction genre, and they cannot cope with the amount of information required for interacting in a virtual reality environment. This kind of a connection will only be

possible with the improvement of the connection between the neurons and the machine electrodes or computer chips.

### **3.3.3. Cyborgs with the Idea of Restructured Users**

This idea is mainly inspired by the famous maxim of Wiener's:

*We have modified our environment so radically that we must now modify ourselves.*

*- Norbert Wiener*

Cyborgization is a term offered by Hayles, with her words: "transforming human subjects into hybrid entities that cannot be thought without the digital inscription apparatus that produces them." This kind of hybridization of human or in other terms restructuralization of the user is proposed by Hayles as follows:

Computers are much more than hardware and software. In their general form, computers are simulation machines producing environments, from objects that sit on desktops to networks spanning the globe. To construct an environment is, of course, to anticipate and structure the user's interaction with it and in the sense to construct the user as well as the interface. (Hayles, 2002)

The most popular applications of this kind of a reconstruction of a human, is the arcade consoles especially the ones that require wearing things like a head display and carrying a tangible gun, sometimes referred as the "arcade cabinets" or virtual "reality arcades". However, this kind of a wearing is not a must to interact with an environment as such but it dramatically improves the immersive affect and so the 'as-if' quality of the game.

In order to employ the terms and concepts to discuss in the field of product design categories of objects, which should be taken into consideration in this context should be defined and depicted.

### **3.4. New Cultural Objects**

The context of the term “new cultural objects” is expanded from the way it used by Manovich. He uses this term to indicate a number of media objects like Internet, Web sites, computer multimedia, computer games, CD-ROMs and DVD, Virtual Reality, and computer-generated special effects. But in the scope of this study a broader context for it will be defined with reference to Manzini and Diani. In general it will be containing products, which employ these media in order to communicate with their users. At this point it is a suitable approach to define the new cultural objects as the designed products of the post-industrial age and which are mostly computer mediated. The common feature of these products, which is also mentioned by Dormer for the age of miniaturization of working parts, is further explained by Diani with reference to Manzini (Manzini 1988) as follows: “The physical components have become invisible; the mechanism that makes the object work is a minute electronic heart.” At this point the same occurrence is discussed and described by Prasad Boradkar in the sense of the skins of the objects where he categorises the skin type, which encloses the physical components of gadgets as shielding skins (Boradkar 2004).

The other common features of post-industrial design and designer are listed in comparison with industrial design by Diani as follows, but they do not necessarily comprise all products concerned in this context.

Table 3.1 Contrasting Features of Industrial and Post-industrial Design (Source: Diani 1992, 6).

<b>Industrial Design</b>	<b>Post-industrial Design</b>
Products are:	Products are:
Specialized	Generalized
Single-purpose	Multipurpose
Short-lived	Long-lived
Replaceable	Repairable
Mass-produced	Short-run
Standardized	Customized
Optimum	Satisfactory
Process is:	Process is:
Autocratic	Democratic
Internalized	Externalized
Exclusive	Inclusive
Intensive	Extensive
Rigid	Relaxed
Designers are:	Designers are:
Creative	Collaborative
Individual	Anonymous
Professional	Participatory

Dealing with the new cultural objects, especially with their functions, and as these functions operate through processes of communication, the necessity of using the concept of immateriality comes up. At this point it is important to notice the drawback by Moles as he states that: “Any immaterial civilization will be heavily materialized because its immaterial products are necessarily linked to the mechanical infrastructure that generates, stabilizes, and governs them.” (Diani 1992) In other

words the functions of these products has nothing to do with materials, they just operate through media and interfaces. On the contrary Manzini writes the following:

All high-technology objects will continue to have a surface, a skin, which will continue to be charged with emotional and symbolic tensions. Very few people have explored the cultural implications of new material/immaterial objects. Furthermore, in intelligent objects we see the result not the cause. The physical components have become invisible; the mechanism that makes the object work is a minute electronic heart. The object is seen solely for its performance. It is no longer in front of me, for me to interpret. The relationship changes from asymmetrical to symmetrical and hence specular: I make a move and it makes another. (Manzini 1988, 62)

Here, Manzini refers to nothing but interactivity and what he calls high technology; intelligent objects are, in this context, called “new cultural objects”.

Another valuable reference among new cultural objects and their communication skills pertaining to their technological status is the concept of ‘automatism’ introduced by Baudrillard as the following:

If formal connotation is summed up in the word FASHION, technical connotation is epitomized by the notion of AUTOMATISM, which is the major concept of the modern mechanistic triumphalism, the ideal of its mythology. What automatism means is that the object, in its particular function takes on the connotation of an absolute. (Baudrillard 1996, 109)

The new cultural objects mentioned in the scope of this thesis are lately studied by Bruce Sterling. Sterling is known as a science fiction writer and in many of his work he floats between science fiction and the field of product design. In his books he names these objects as ‘spimes’. His definition of the domain of the ‘spimes’ both covers the definition done by Baudrillard as gadgets and gizmos and also covers the definition which will be made later on this chapter as ‘new cultural objects as body extensions’. Even though his book titled ‘Shaping Things’ is published but not

distributed yet there are a bunch of reviews and responses that may be found on the Internet. In one of these reviews Moggridge states that:

Sterling offers a brilliant, often hilarious history of shaped things. We have moved from an age of artifacts, made by hand, through complex machines, to the current era of "gizmos." New forms of design and manufacture are appearing that lack historical precedent, he writes; but the production methods, using archaic forms of energy and materials that are finite and toxic, are not sustainable. The future will see a new kind of object -- we have the primitive forms of them now in our pockets and briefcases: user-alterable, baroquely multi-featured, and programmable -- that will be sustainable, enhanceable, and uniquely identifiable. Sterling coins the term "spime" for them, these future manufactured objects with informational support so extensive and rich that they are regarded as material instantiations of an immaterial system (Moggridge 2005).

Baudrillard, with reference to Simondon, exemplifies the notion of automatism with the elimination of starting-handle from the cars. It is claimed that use of a storage battery that is external to the system increased the complication and the abstractness of the system to start the car (Baudrillard 1996).

From another point of view Morgantini scrutinizes the obsolescence of identity among these objects as follows:

The current faceless glut of objects, the multifunctional crossbreeding (watches with calculators, or calculators with watches), the loss of object identity and the fact objects are no longer classifiable individually are counterpoised by the sense of a more mature and accepted artificiality. (Morgantini 1992, 38)

If a metaphoric transition is constructed from the word "faceless" that Morgantini uses, the question arises as: "Do they really need a face?" This question will be answered later on in this section where a comparative survey between Apple iPod and Sony Walkman will be accomplished in the discussion of replacement of the



tangible communication assets with interactivity as a major concept in new media literature.

### **3.4.1. New Cultural Objects as Body Extensions**

Up to this point various approaches to the body extensions, medical prosthetics, and cyborgs have been investigated and a domain for new cultural objects is defined. At this point, it is seen that sometimes it gets confusing to decide the point when a tool is a body extension or a prosthetic. As an example to this confusion, Avital Ronell points out in her book titled “The Telephone Book: Technology - Schizophrenia - Electric Speech”, that the phone was originally intended as a prosthetic device for the hearing impaired but today it is not easy to consider a regular telephone device as a prosthetic. This example shows that the tendency to design new cultural objects, electronic gadgets like body extensions which will be exemplified and further scrutinized later on, is not only related with the technology. This tendency also has its roots in the concepts like mobility and personalization.

Cellular phones of today, with the exceptions of various cultural design parameters, are being designed like a body extension. Sometimes bodily itself, or sometimes with the aid of complementary accessories like headsets and external microphones, the user does not need to communicate with the telephone itself to use its main function which is transmitting his/her voice to a desired location and receiving the voice from the same location. Instead of holding the body of the cellular phone in hand and dialling the numbers, this action can be handled via voice recognition to indicate the desired location or the person and headsets and microphones, which are almost body extensions for the modern human of our age, to transmit and receive the voice over.

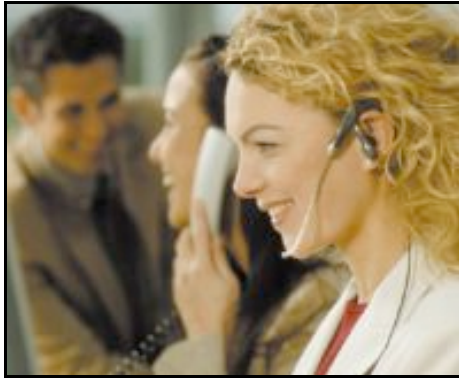


Figure 3.7 (left) A woman using headset (Source: [www.vodafone.com](http://www.vodafone.com)).



Figure 3.8 (right) Cell phone complementary accessories (Source: [www.vodafone.com](http://www.vodafone.com)).

A Walkman and its brand new version iPod, which will be the subjects of a comparative survey dealing with the issue of interactive quality of new cultural objects. As mobile and personal stereo systems, not only due to their mobility but also due to their isolating and personal character, they may be considered as body extensions.

These examples among new cultural objects as body extensions may be broadened while our modern environment is surrounded by personal, ergonomic, mobile electronic gadgets and when these gadgets are seeking various media to interact with its user. With further scrutiny on the occurrence, it may be supposed that the new cultural objects are leading human beings and modern societies to cyborgization.

### **3.4.2. New Cultural Objects with Interactive Qualities**

Another aspect of the new cultural objects is their interactive qualities as well as their embodiment within the user.

Without going into the discussion of the sign value created by their skin, which, according to Manzini, will continue to exist, the answer will be given to this exact question: “Do they really need a face to communicate with their user?” In order to

find the answer, a to the point, comparative survey can be made between Sony Walkman<sup>10</sup> and Apple iPod. These two products are chosen because of their similarity as cultural artefacts and difference among the media technology they employ. Taking a quick gaze at their press releases in the time they were introduced to the market, similar slogans like “listening to music will never be the same again” can be seen. At the same time the shift in the media technology they employed just fitted in the scientific historical analysis put by Kittler, which had been studied in detail in Chapter 2.

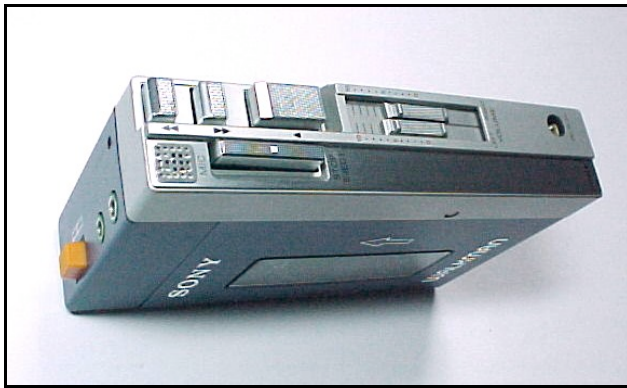


Figure 3.9 (left) Sony Walkman (1979) (Source: [www.sony.com](http://www.sony.com)).

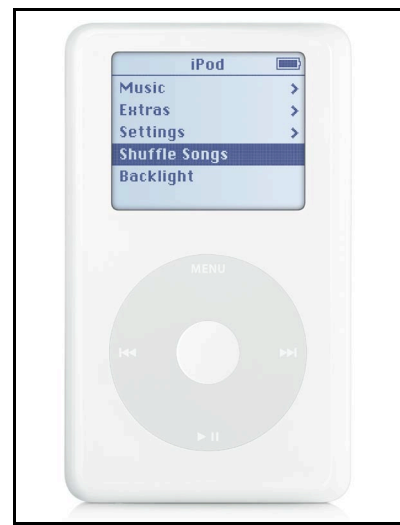


Figure 3.10 (right) Apple iPod (2001) (Source: [www.apple.com](http://www.apple.com)).

Sony Walkman incorporated magnetic tape as media, which needed electromechanic mechanisms to operate. These mechanisms are controlled by the user through push or sliding buttons. This means a direction specific physical input to the system is needed to control it. In the case of the iPod the mechanism is consisted of digital data storage and a sound card – audio circuit, a processing unit and software, which produces the sound waves from the digital data. So, there is no need for a physical

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<sup>10</sup> After losing a large portion of the market to other companies, Sony's latest attempt to revive the Walkman brand is a joint effort with the Swedish phone maker, Ericsson. The Sony Ericsson 'W800i' will have numerous audio features besides those of a top-of-the-range mobile phone. It should be noted that the Sony Walkman mentioned here is the cassette player introduced to market in 1979.

contact with the mechanism other than an electro-physical intervention through an interface. In this case the whole control mechanism is reduced to a touch sensitive ring and a push button to navigate through the software. The main control actions like selecting a song or forward-rewind are monitored via a LCD<sup>11</sup> screen. The use of touch sensitive panel is prescribed in the press release of iPod as follows:

Apple has applied its legendary expertise in human interface engineering to make iPod the easiest to use digital device ever. Simply rotate iPod's unique scroll-wheel with your thumb or finger to quickly access your entire music collection by playlists, artists or songs. The scroll-wheel makes it possible to hold and operate iPod with just one hand and features automatic acceleration when scrolling through long lists so you can find your music in seconds. (Apple Press Release 2001)



Figure 3.11 (left) Knob of a conventional Hi-Fi system (Source: [www.marantz.com](http://www.marantz.com)).



Figure 3.12 (right) Scroll-wheel of iPod (Source: [www.apple.com](http://www.apple.com)).

Of course one can argue that touch sensitive scroll-wheel of the iPod is a reference to volume control knob buttons of the hi-fi systems or of the Sony Walkman of the 1970's, and further claim that this is an issue of product semantics in one sense. In the sense that, a scroll-wheel should recall an action like turning it in mechanical or touch-sensitive ways, and in the iPod case no doubt it does. This is the point to recall the methodology offered by the new media theoreticians, which was mentioned in the Introduction, 'archaeological methodology'. The knob is nothing but the archaic

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<sup>11</sup> Abbreviation for "Liquid Crystal Display" – molecules of the LCD react to electrical charge. In its charged state a segment of the display appears darker than when it is uncharged.

form of the iPod's scroll-wheel in other words the scroll-wheel works 'as-if' a knob button. Additionally, examining the prescription for the use of this scroll-wheel in detail, another interesting feature is found. It is that, the same structure works to navigate through the files, folders and other applications in the disk as well as volume control. This type of an action hardly recalls an action like scrolling or turning something. One reason for this type of a navigation may be proposed as, keeping the simplicity of the product, providing many controls in one unit, but experiencing the product it may also be noted that it also works for engaging the user or in other terms providing a pleasurable communication with the user through interaction. To conclude, it is seen that in the case of iPod product semantics terms are not enough to discuss this communication between the product and the user.

It can be observed that, as the physical engagement of the user with product decreases, the necessity of settling the tangible communication signs during the design process diminishes. Even when this fact seems like an analogous situation fixed by Dormer mentioned in the section named "Tools", it also should be noticed that this analysis is focused on the ways that the product communicate with its user. In the case of iPod where the control and navigation utilities reduced to a LCD screen and a touch sensitive panel, the tangible product semantics oriented design features are replaced by the features dictated by the human computer interaction (HCI) doctrine, which are predictably inspired by the new media principles.

Turning back to question in concern "Do they really need faces?", after this brief comparative study it is seen that they need "interfaces". The mode of communication between the product and the user changes by changing the medium of communication.

The idea of interactive aesthetics has been mentioned in the previous chapter while discussing the interactivity as a primal concept in new media literature. In the case of iPod the product is an engaging object via its interactive qualities, in other words it is designed as interactively aesthetic object. This inevitably affects the style of the product in a general sense. This occurrence is best explained by Baudrillard in his

words as: “Miniaturization and gestural depletion erode symbolic expressiveness.” (Baudrillard 1996, 118)

This idea takes the discussion back to the Morgantini’s analysis of the current faceless glut of objects.

### **3.4.3. New Cultural Objects with Immersive Qualities**

The isolative character of these new gadgets not only depends on their mobile features but also on their immersive temperaments. As mentioned in the Introduction of this study, immersion is another important issue in the field of new media where it is regarded as the archaic form of virtual reality or in other terms the essence of virtual reality. Tracing its status as a concept in new media from Manovich’s point of view, it finds its place in the issue of virtual reality where he states that:

The tradition of the framed image, i.e. a representation which exists within the larger physical space which contains the viewer (painting, cinema, computer screen), meets the tradition of the "total" simulation, or “immersion,” i.e. a simulated space which encloses the viewer (Panorama, VR). (Manovich 2001, 241)

The critical distance of embodiment between the product and the user may be considered as the main concern while considering the immersion of the user in the product. Whereas, on the contrary Grau states:

Obviously, there is not a simple relationship of “either-or” between critical distance and immersion; the relations are multifaceted, closely intertwined, dialectical, in part contradictory, and certainly highly dependent on the disposition of the viewer. (Grau 2003, 13)

Before going into the exemplification of this immersive effect in the realm of new cultural objects, it is necessary to investigate how this process works. Grau states

that immersion is mentally absorbing and it is a process, a change, a passage from one mental state to another as well as a stimulating process intellectually, where it is qualified by diminishing critical distance to what is shown and increasing emotional involvement in what is happening (Grau 2003, 13). As a result it may be concluded that immersion does not only deal with the physical distance in between the product and the user but also it can be enhanced with interactive and visual features.

The miniaturization of new digital products can be explained by the availability of technology to produce them smaller and the necessity of its mobility as a cultural object. But also it can be noted that as the object gets smaller the necessary conditions for the user to break through the critical distance and the immersive qualities of the products' enhances. For example, a notebook with a 12" screen requires a distance like 6-inches to communicate, where as for a typical 17" desktop monitor a seating distance about 18-inches–24-inches is recommended (Apple Website, ergonomics, 2005). Thus, as the objects gets smaller immersive as well as isolating qualities of the product increases.

### **3.5. Transformation in Product Semantics**

As mentioned in the Introduction, and with reference to the observations and the investigations carried out earlier in this chapter, one of the most interesting shifts to be expected in design literature in regard to new media terms and concepts is the transformation in product semantics as an important field of research in the field of product design. This transformation will be discussed throughout this section.

In the Introduction, a brief definition for product semantics is made: "Product semantics, is a subject of consideration, based on the suggestion that a product's form should easily communicate the function of the product." However, this definition holds to cover the issue in general sense, in order to trace its significance in relation with communication theory and so with the medium of communication and finally with new media: It is essential to examine its origins through semantics as a study of meaning in language. This approach is also inspired by the title of the

book by Manovich “Language of the New media”, since in order to understand and develop strategies through communication, the language of the medium should be known.

A basic definition for the study of semantics is given by Giard as follows:

The study of semantics is the study of meanings in language (Harford and Heasley 1983). It is an integral part of most schools of philosophy, although some schools of philosophy perceive it as a bridge between philosophy and linguistics (Kempson 1977). It attempts to bring an element of understanding to that aspect of everyday life concerned with the written and spoken word. (Giard 1989, 1)

The relationship between semantics and the product semantics is also constructed by Giard, as: “product semantics also deals with the study of meanings, but as they are communicated in manufactured objects.” (Giard 1989)

As mentioned above product semantics studies in the context of design literature are derivatives of the same philosophical origins as linguistic semantics. Main difference occurs when the type of the language is considered. Giard explains this difference as such: “However, instead of using known written or verbal codes or languages, the designer uses a visual language, a less developed and less understood form of communication” (Giard 1989). Further details of this explanation is as follows:

Product semantics relies on an alphabet of signs and symbols, e.g., line, colour, texture, shape, and form. By manipulating this visual alphabet, the designer repeats a similar process to the one found in the written or spoken language. (Giard 1989, 2)

In order to make use of this explanation in the context of this study, the notion of visual language, offered by Giard should be expanded, again with reference to his



detailed explanation. Since the alphabet prescribed above includes the texture as well as line, colour etc., the language may be offered as visual and tangible language.

Making use of this language, objects and humans communicate through a process. This process takes place in the medium of communication and reconciles the object and the human on the issue of meaning of the product. Buerdek describes this process as follows:

The aspect of communicating design was in former time based on models of engineering, like cybernetics. But design communication is much more orientated towards socio-cultural, personal and situates processes. Under this aspect it is important, that `product language is not an autonomous discipline, because products really don't talk by themselves. The meaning of a product is generated in a process between the producer, the user and the context of both. The participants in such a process reconcile what the specific meaning of a product is. (Buerdek 2003, 2)

The meaning of a product may both refer to its semantic qualities or the semiotic features of the product. Throughout this discussion meaning is taken as the semantic qualities of the product for the sake of investigating the communication possibilities of the product with its user. Just in the sense described by Krippendorff as: "Design concerns itself with the meanings artefacts can acquire by their users." (Krippendorff 1995). At this point Baudrillard's thesis that is miniaturization and gestural depletion erode symbolic expressiveness, and another important definition for product semantics by Krippendorff as: "Product semantics is nothing other than a reaction to the missing *sense* modern industrial products make or deliberate effort to recapture this lost territory for design." (Krippendorff, 1989) may be recalled. These determinations strike the importance of restudying product semantics in the era of new media technologies. The transformation in product semantics may be studied via two main different perspectives. First perspective, is an endeavour to rebound the symbolic expressiveness of the product, second is through a perspective to analyse the operational communication between the product and the user. This study focused on the second perspective.

A brief review on product semantics and examinations on the scope of objects examined in the contexts of medical prosthetics, wearable electronics and in general new cultural objects lead to an assumed conclusion, and this conclusion also has its roots in the scientific analysis of media technology history drawn by Kittler. It is that, the product semantics as a visual language is replaced by interaction via an interface, and interaction, where premeditated information flow is its main constituent, has the potential and the tendency to be replaced by the direct (neural) connection between human and machine, in other words flesh-machine connection.

Krippendorff claims that designers and ergonomists with an awareness of how to use function of design can “demystify complex technology, improve the interaction between artefacts and their users and enhance opportunities for self-expression” (Krippendorff and Butter 1984, 4). At this point it is interesting that the flesh-machine integration promises to demolish the interaction between artefacts and their user instead of demystification of complexity. Depending on the idea presented up to now, complex technology, say, flesh-machine connection equipped with AI, is not something to be demystified but a tool to liquidate the interaction between human and machine. In this case while the connection provides to communicate with the product ‘as-if’ it is a body organ (body extension), AI provides the data to overwrite the necessity for interaction. Also it is obvious that semantic expressiveness of the product is not a necessity in this case.

## CHAPTER 4

### NEW MEDIA AS DESIGN AND PRODUCTION MEDIA

This chapter will mainly deal with the new media as design and production media with reference to basic principles stated by Manovich and pointed out in detail in Chapter 2. This segment of the research is motivated by two distinct approaches by McLuhan and Hayles. First one is the maxim by McLuhan “medium is the message” as mentioned in the Introduction, assuming that the messages coded on the products during its design process can not be detached from the medium of production. This assumption is an indirect approach to McLuhan’s thesis. Second, Hayles puts forth the issue as “a mode of critical interrogation alert to the ways in which the medium constructs the work, and the work constructs the medium.” (Hayles 2002).

The analogy between the methodology, the propositions of Hayles’ and the propositions of thesis study is constructed through the idea that both digital literature and the products of the future work through interfaces with its viewer or user. Outcomes of her analysis are thought to be significant to theorize this issue.

The discussion to be held throughout this chapter will fit in a context defined by the third perspective of the framework, which perceives new media as design, and production media, described in the Introduction.

Since the main concern in this chapter is to deal with metamorphosis of design and production media and even also their integration, it is realistic to declare that the main focus will be computer based design applications and tools. At this point Manovich argues that traditional concepts like tool or medium do not work very well

in relation with new media and he offers to use the term ‘operations’, further acknowledging the following:

While the operations are embedded in software, they are not tied up to it. They are employed not only within a computer but also in the social world outside it. They are not only ways of working with computer data but also general ways of working, ways of thinking, and ways of existing in a computer age. (Manovich 2001, 118)

The basic principles of new media introduced in the first chapter of the study will be the main reference for this analysis. In order to comply with Manovich’s, the term ‘operation’ will be used to mention the software, computer mediated tools, or digital media applications. The framework for these operations has been drawn in the early 80’s and was established with the introduction of first Macintosh interface called ‘Lisa’. The framework called “Direct Manipulation” was introduced by Shneiderman in 1983. In his article titled “Direct Manipulation – A Step Beyond Programming Languages” he has combined terms and concepts like human computer interaction, visual displays, authoring software and computer aided design and manufacturing. In the simplest sense he exemplifies the notion of direct manipulation as follows:

Driving an automobile is my favorite example of direct manipulation. The scene is directly visible through the windshield, and actions such as breaking or steering have become common skills in our culture. To turn to the left, simply rotate the steering wheel to the left. The response is immediate, and changing scene provides feedback to refine the turn. Imagine trying to turn by issuing a LEFT 30 DEGREE command and then issuing another command to check your position, but this is the operational level of many office automation tools today. (Shneiderman 2003, 487)

Inspired by this exemplification with reference to Shneiderman, a direct manipulation system that can be defined as a system that seeks to imitate something in the outside world via an interface metaphor is neither actually direct, nor is it manipulation (operate something with hands); but it relates the computer activity to an ordinary action, rather than requiring use of a special purpose command language. After this brief exemplification and definition of this notion, it can be construed that the set of software widely used by designers, artists or other type of authors depend

on this basic framework drawn by Shneiderman. It also should be noted that the method offered by the new media theorists named as ‘archaeological methodology’ seeks for these metaphors but with the assumption that they are not metaphors but objects of archaeological research.

Also as argued in the introduction, the transformation in the design process and forms will be examined focusing on three main points, which are visualisation, production and logic of selection.

#### **4.1. Visualisation and Formal Impact**

Design has undergone a change with the impact of digital revolution in a formal sense where this effect can better be observed in the field of architecture by means of three-dimensional forms and volumes, rather than in the field of product design. The reason for this occurrence may be found in the Dormer’s examination on design and technology. Dormer analyses the impact of digital technology on product design practice in parallels with the advanced use of plastics (Dormer 1993). From his analysis it can be grabbed that main formal effect was the invention and use of plastics more than the emergence and availability of new media technologies. Architectural practice was not really affected with the invention and wide use of plastics. So, the first example given in the Introduction is not a coincidence. “Poeme Electronique”, Philips pavilion in 1958 at Brussels World Fair, may be added to this as one of the earliest examples of architectural form designed by means of parametric algorithms. The issue of designing with parametric algorithms will be introduced with details and as an idea in the subsection of ‘Dynamic Form’. These kinds of examples are in the agenda of product design literature where Pak argues that architectural process transforms into a computer aided industrial product development process (Pak 2005). This transformation occurs in two ways. First a building as the product of architectural process becomes an integrated medium of space, sound and light. In a way it becomes multimedia. Second, due the integration of production techniques, buildings are constructed making use of moulds and with plastic surfaces (as in the case of Kunsthaus) where the production techniques between architecture and product design diminishes. This kind of a technique is called the ‘file to factory’.

Returning back to Dormer's analysis, however, it can be said that it validates one point, that is the effects of the advancement of CNC three dimensional prototyping machines, in other terms, 3D printers, can not be neglected. Using these mechanisms one can produce a mould for serial production for almost every kind of form he/she has drawn rapidly. At this point his approach, analysing the impact of digital technology on product design practice together with the advanced use of plastics, makes better sense.

#### **4.1.1. Dynamic Form**

Computer aided designed form is dynamic in two senses. It is dynamic due its geometry and it is dynamic through the design process. Additionally it is dynamic in scale when it is subjected to representation.

The form is dynamic due its geometry since digital operations allow users to demonstrate more amorphous forms, which can hardly be sketched with non-algorithmic operations. The result of these algorithmic operations, say three-dimensional drawings, can be transformed into moulds for serial production.

As studied in the previous chapters under the principles of new media, it has been stated that digital data is subject to manipulation because it originates in numerical form and this form is subject to algorithmic manipulation. Running an algorithm is nothing but processing of information in accordance with set or changing parameters. This occurrence leads to the idea of parametric design where as the parameters change, the product changes accordingly. This is something to face before the automation of design. It was stated that the principles lead each other and now it has seen that their impacts also lead to another.

#### **4.1.2. Principle of Variability in Production**

In the previous chapters variability was explained as such: "A new media object is not something fixed once and for all but can exist in different, potentially infinite,

versions.” (Manovich 2001). On the transformation among production techniques regarding the variability principle, eight years before Manovich, Dormer articulates the following:

The introduction of computer driven tools has meant that shorter production runs and different runs of similar but not identical products can be produced economically (Dormer 1993, 33).

This characteristic is further scrutinized by Manovich in the context of new media. He states that new media corresponds to logic of “production on demand” and “just in time” delivery which themselves were made possible by the use of computers and computers networks in all stages of manufacturing and distribution. Manovich also articulates his statement with reference to Adorno: “Here "culture industry" (the term was originally coined by Theodor Adorno in the 1930s) is actually ahead of the rest of the industry.” (Manovich 2001).

This feature also leads to the ease of customization of products. However, Manovich states, “the idea that a customer determines the exact features of her car at the showroom, the data is then transmitted to the factory, and hours later the new car is delivered, remains a dream, but in the case of computer media, it is reality.” Due to the economic scale of production and production with the use of variable production techniques, it is not a dream today.

#### **4.2. Real-Time Testing and Integration of Design and Production Media**

George Lucas shot his latest Star Wars epic with digital cameras, edited it digitally by using compositing software and finally printed it on 35mm. celluloid for presentation and distribution. The experience of the audience was no different than if it had been shot on celluloid, so categorizing his film as an object in new media or old media is a point of discussion to be held in a different context. More important issue is that the director focuses on the specifics of digital production, and on the real-time testing quality of digital tools of production. Shooting directly on celluloid, the director had to wait at least for a few days to see the result of the shooting. This new opportunity provided by digital production not only decreases the time and costs

of production but also provides the opportunity for the director for rapid intervention on the set. In one of his interviews he states that, having the opportunity to see exactly the same image that the audience will see when the film will be released is the major outcome of the emerging digital production techniques and adds that his company 'Industrial Light and Magic' is working further on more advanced pre-vision systems.

In order to further examine the characteristics of the real time production methods offered by the emerging new media technologies digital photography and the transformation of photography as a practice can be investigated. Even though this investigation may yield results to discuss beyond the scope of this thesis, two key observations may be presented in this context. First, digital camera changes the gestures of the photographers, as such: Shooting with analog cameras, photographer, just after releasing the shutter, gazes at the subject that is shot, but with digital cameras, photographer looks directly at the LCD screen of the camera to see the result of the exposure. Photographer prefers to see the result in the shortest time instead of observing the next moment of the subject. This transformation of photographer's gesture may find a deeper ground of discussion in the field of photography but it is a good example to demonstrate the effect of the availability of the real time production. The second issue regarding the digital photography is its resemblance to Polaroid<sup>12</sup> photography. It is hard to argue that the Polaroid cameras are the archaic forms of the today's digital cameras, but it is obvious that they operate in the same manner not technically but in the sense they both provide real time photographic production. From another point of view, both media, in the sense that they employ to operate, allow real time production. Even when this resemblance could be scrutinized in the third chapter, the result will be discussed further in the Conclusion and Discussion.

So, as well as in many other fields, real time production has its effects on the field of product design, which will be discussed below:

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<sup>12</sup> Polaroid (a trademark of the Polaroid Corporation) is the name of a type of synthetic plastic sheet, which is used to polarize light while at the same time it is used to indicate the instant cameras using this sheet. An Instant camera is a type of camera with self-developing film.



The opportunities provided by new media technologies for real time testing can be mentioned in two distinct manners: First, virtual reality testing environment and secondly, rapid prototyping technologies.

On the increasing use of virtual reality in the fields like product design and architecture, Grau states that virtual reality and its image culture should not be considered as an isolated phenomenon of the embodiment of art and technology, they are integral parts of revolutionary developments in the economy and military technology (Grau 2003).

Grau mentions the potentials and capabilities of the virtual imagery in relation with the extensive representations as follows:

Virtual imagery proposes “as-if” worlds. In a potentially infinite, additional space, it develops extensive representations, which connect largely with the appearance of experienced reality, developing it or overwriting it, and the dynamic capability of genetic algorithms appears to bring it to life. Virtual images rely on the ability of computers to copy real or model imaginary worlds while at the same time referring to a utopian space of what is possible (Grau 2003, 252).

One of the main contributions of the virtual reality applications to the design of product is the virtual modelling of the product that suggests a virtual experience of the product before it has been produced. Designers, operating and utilizing such technologies, have the opportunity of experiencing several versions of design in distinct phases of design process. Moreover, they offer the opportunity of sharing such experience with end users or producers. One can argue that this new occurrence is nothing but a simulation of the older forms of sketching and modelling on canvas, but it should also be noted that virtual reality also provides the opportunity to test the product in its context which is build virtually as well.

This kind of a process is combination of virtual reality and augmented reality or more precisely extension of virtual reality into augmented reality. In virtual reality,

three-dimensional images are projected in head mounted displays<sup>13</sup> (HMD), as two two-dimensional images. The spatial effect results from stereoscopic vision and is formed in the observer's cortex. Grau explains virtuality of this image as follows:

Thus, the images leave their media in a twofold sense: a 3-D image, which has no physical existence except, perhaps, in the excited neurons of the brain, forms a constitutive unit together with the observer and is nonseparable from him or her (Grau 2003, 251).

Augmented reality, which serves as juxtaposing the real image of a pre-recorded environment, occurrence or object with the computer generated virtual image. As stated above, combination of these two realities provides a perfect medium for testing the experience of the user with the product and the various feature of that product.

Grau mentions the second manner for testing opportunity combined with the first one as follows:

Of particular interest were applications for developing prototypes faster, simulating industrial production process, constructing walk-in simulations of the built environment from the past, present, and future, visualizing scientific search results, and simulation aided research (Grau 2003, 173).

Computer aided design and manufacturing process is already introduced and their first-hand effects on design process have been discussed in brief with reference to Dormer in the first chapter. CAD/CAM systems can be mentioned as a testing environment for the formal aspects of the designed product and a self-sufficient production environment as well. Self-sufficient design and production, characteristic of the new media technologies as mentioned before, evokes an idea of pre-industrial production and unpredictably these ideas are quite similar to those post-industrial design and designer features presented by Diani, which are mentioned in Section 3.4. In order to name a few, products representing both era are customized and satisfactory and also the designers in the same sense are collaborative by means of communication between the designers and end users or producers.

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<sup>13</sup> HMD's are small screens, which are attached directly to the user's head in the form of dataglasses or a data helmet.

Sterling in his book ‘Shaping Things’, which was mentioned in the third chapter, defines a loop between the design and the production medium of ‘spimes’ and Moggridge in his review quotes this description of the loop as follows:

Spimes are designed on screens, fabricated by digital means, and precisely tracked through space and time. They are made of substances that can be folded back into the production stream of future spimes, challenging all of us to become involved in their production. (Moggridge 2005)

This production loop defined by Sterling recalls the variability and modularity principles of new media defined by Manovich. These two principles also lie beneath the logic of selection.

### **4.3. Database and Logic of Selection**

Studying the variability principle in the second chapter, a term like ‘media database’ has been introduced. Logic of selection is also a prolongation of modularity principle as well as variability principle where modularity is explained in brief as the fractal structure of new media. This term represents the main constituent where the logic of selection works. Manovich best explains the logic of selection in these words:

All in all, selecting from a library or menu of pre-defined elements or choices is one of the key operations for both professional producers of new media and for the end users. This operation makes production process more efficient for the professionals; and it makes end users feel that they are not just consumers but “authors” creating a new media object or experience. (Manovich 2001)

Library or menu of pre-defined elements resembles a ‘media database’ where the logic of selection works. Pre-defined elements are usually interpreted as libraries or plug-ins in software terminology. Various examples can be found regarding various different professional authoring software. The following examples demonstrate libraries and plug-ins that may be used with the most popular software used by the designers. Viewpoint Datalabs International is marketing thousands of 3D geometric models widely used by computer animators and designers. Adobe Photoshop 5.0 comes with more than one hundred filters which allow the user to modify an image in

numerous ways; After Effects 6.5, the standard for compositing moving images, is shipped with eighty special effects plug-ins; thousands more are available from third parties. Macromedia Director 7 comes with an extensive library of “behaviours” ready-to-use pieces of computer code. Auto Desk 3D Studio Max the leading modelling and three-dimensional design software, is shipped with over four hundred textures which can be applied to 3D objects and many other pre-drawn three-dimensional models are available ready to use provided by various companies.

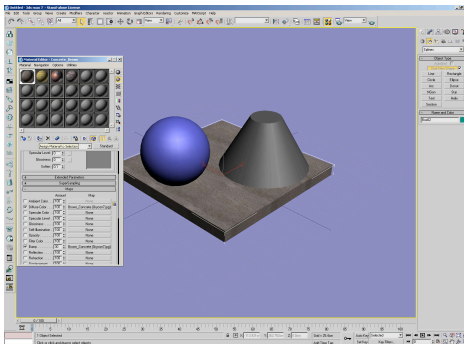


Figure 4.1 (left) Screenshot from the interface of 3D Studio Max, Material library (Source: Screenshot by Refik Burak Atatür).

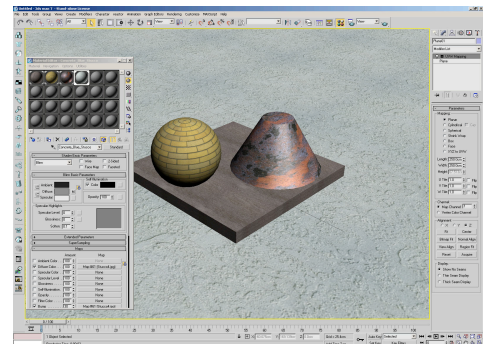


Figure 4.2 (right) Screenshot from the interface of 3D Studio Max, Material mapping applied (Source: Screenshot by Refik Burak Atatür).

Designers, today, hardly creates something from the scratch but rather they design selecting from database, libraries and creating compositions or reformations.

Manovich also argues that this kind of an authorship has its particular dynamics of standardization and invention. Moreover, this new type of authorship brings along a new cultural logic while at the same time one can argue that historical genesis and theoretical background for this new cultural logic can be found in old media forms as well. In order to trace the transformation due to change of production media it may be useful to look at the history of art and observe the changing logic of production.

Manovich traces its roots in the art and design history with reference to term ‘culture industry’ by Theodor Adorno and history of art, he argues that artisan environment resisted to reproduction techniques as the rest of the culture moved to mass production and automation. He adds: “Yet, although photomontage became an

established practice of Dadaists, Surrealists, and Constructivists in the 1920s, and Pop artists in the 1960s, the creation from scratch, as exemplified by painting and drawing, remained the main operation of modern art.” On the contrary electronic art from its beginnings relied on the modification of an existing signal. The first electronic instrument designed and produced by Theremin was introduced in Chapter 2, and the same logic held for the technologically more advanced video synthesizers and other similar instruments. Manovich articulates this operation with the logic of selection as follows:

Substitute a simple sine wave by a more complex signal (sounds, rhythms, melodies); add a whole bank of signal generators and you have arrived at a modern music synthesizer, the first instrument which embodies the logic of all new media: selection from a menu of choices (Manovich 2001, 126).

Lastly to demonstrate the logic of selection, the DJ as a cultural figure in the age of reproduction can be a fitting example as Manovich states:

DJ best demonstrates its new logic: selection and combination of pre-existent elements. DJ also demonstrates the true potential of this logic to create new artistic forms. Finally, DJ example also makes it clear that selection by itself is not sufficient. The essence of DJ’s art is the ability to mix the selected elements together in rich and sophisticated ways. In contrast to “cut and paste” metaphor of modern GUI which suggests that selected elements can be simply, almost mechanically combined, the practice of live electronic music demonstrates that true art lies in the “mix.” (Manovich 2001, 135)

Going over the Manovich’s analysis in regard to history of art, on this new type of authorship, it can be observed that this brings about an approach to design analogous to bricolage. Bricolage is a term introduced by Claude Levi-Strauss with a basic meaning like construction or something constructed by using whatever materials happen to be available or the practice of working with whatever materials are at hand, "making do" with what one has.

Claude Levi-Strauss also reflected on what he called bricolage. The process of creating something is not a matter of calculated choice but rather involves “a

dialogue with the materials and means of execution” (Levi-Strauss 1972). In such a dialogue, the materials that are ready at hand may “suggest” the process and the initial aim may be modified. In addition to this discussion, Chandler suggests that bricolage can be involved in the use of any medium for any purpose (Chandler 2001). Recalling the examples given in the beginning of this section as library or menu of pre-defined elements, in short ‘media database’ resembles ‘materials at hand’, the analogy between bricolage and designing with new media technologies and the logic of selection becomes inevitable. The combination of these two comments on bricolage as a process, which in this context intended to be used to signify design process, demonstrates the theoretical reasoning why new media operations call for a new type of design process analogous to bricolage.

Referring to Levi-Straus again, bricolage as a cultural practice signifies the activity of taking consumer products and commodities and making them one's own by giving them meaning. Certainly it is assumed that commodities here, due to their exchange value, carry some kind of meaning and it is arguable if they lose their original meanings through the process of bricolage. So, to conclude, it is still not appropriate to extend Manovich’s maxim “artist of the future is not the one using the software but the one designing the software”, which is mentioned in the second Chapter of this study. This maxim is still far from being extended into the design discipline but it is obvious that discussion held over the design process with reference to logic of selection offered by new media technologies has the potential to change the designerly way of thinking radically. At this point it has been clear that the assumption as an indirect approach to McLuhan’s thesis earlier in this chapter has found its base to be proven.

### **4.3. Hayles’ Approach - Media-specific Analysis**

In order to establish a theoretical background for the research conducted on formal and practical outcome of the impact of the emerging new media technologies on the field of product design it may be appropriate to introduce Hayles’ approach. Her approach proposes materially-based studies in literature writing and as an extension, media-specific analysis in order to discuss the materiality of the text and so transformation of literature due to emerging new media technologies. This approach

is thought to be an analogical roadmap for the endeavors to hypothesize the impact of the new media on product design. The roadmap from materially-based studies to media-specific analysis is not a new idea for the study. What has been discussed in the previous chapters evokes the necessity and the importance of such an analysis for various media and context.

Her approach covers all three main perspectives in the framework of this thesis study mentioned in the Introduction, but especially focuses on the third one, where she claims that the work and its production medium cannot be detached due to the process of meaning inscription and in order to understand the potentials, critical interrogations of the modalities of these inscription technologies should be made.

Hayles's approach on the issue is found effective, since in her book "Writing Machines" when discussing the necessity of media-specific analysis she moves fluidly between terms such as, materiality, medium and form and these terms are frequently referred throughout the discussions held in the context of this study. She proposes her framework as a roadmap to move from materiality to material metaphors and bases, places media-specific analysis on this ground.

Before going into the details of the outcome of the examination of the media-specific analysis made by Hayles and a derived definition to handle in the context of this study (since it is stated that the notion of media-specific analysis is an extension of materiality) a broad definition of materiality should be reviewed. Materiality may be regarded as, with reference to dictionaries, issue concerned with material wealth and possessions at the expense of spiritual and intellectual values. This definition is not sufficient to define the materiality of a product or an artistic work. Hayles defines it to fit perfectly to the context by stating that materiality emerges from the interactions between physical properties and a work's artistic strategies. She also argues that materiality cannot be specified in advance, as if it preexisted the specificity of the work and concludes along the following lines:

In the broadest sense, materiality emerges from the dynamic interplay between the richness of physically robust world and human intelligence as it crafts this physicality to create meaning. (Hayles 2002, 33)

Apparently, all digital media are reducible to binary data. So, materiality is out of discussion at this stage but it lies in the ‘algorithmic context’ of the media object, a borrowed term from Hayles, stands for the interactive, immersive and productive qualities of the digital media object. This occurrence represents the digital equivalent of materiality within the context in which the content of a digital media form has to be understood, manipulated and transformed. The complexity of this analysis brings out the necessity to introduce a new term as a methodology to coincide with the materiality and its analysis of the new cultural object. At this point Hayles introduces the term ‘media-specific analysis’ for the literature writing studies, to invite theorists and critics to think more broadly on the connections between the materiality and the effect and the perception of the work. This analysis on an artistic work by Memmott brings out two new concepts, which are quite constructive to articulate the analysis of the medium of design and of production and the meaning of the product. First one is ‘creole’ and the second one is ‘communification’.

Embodiment (or from another point of view, interaction) of the work and the medium that it is constructed is exemplified by Hayles in its extreme sense with the introduction of ‘creole’ while examining the famous techno-text named ‘Lexia to Perplexia’<sup>14</sup> by Talan Memmott. Creole by definition, is a new hybrid language that emerges when two different language communities come into contact. In Memmott’s work creole is formed as code erupts through the surface of the screening text, infecting English with machine interactions face of the screening text, in Hayles’s words, “infecting English with machine instruction and machine instruction with English, as if the distinction between the natural and programming language has broken down and the two scripts are mingling promiscuously inside the computer.” (Hayles 2002, 50).

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<sup>14</sup> Techno-text is available only online at [http://www.uiowa.edu/~iareview/tirweb/hypermedia/talan\\_memmott/](http://www.uiowa.edu/~iareview/tirweb/hypermedia/talan_memmott/)



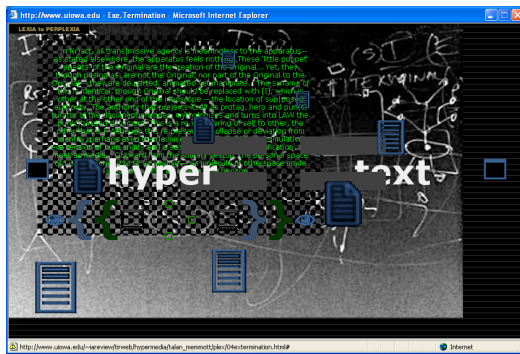


Figure 4.3 (left) Screenshot from the techno-text named ‘Lexia to Perplexia’ by Talan Memmott (Source: <http://iasl.uni-muenchen.de/links/TippMemmotte.html>)



Figure 4.4 (right) Screenshot from the techno-text named ‘Lexia to Perplexia’ by Talan Memmott (Source: <http://iasl.uni-muenchen.de/links/TippMemmotte.html>)

Another interesting concept that comes along with Hayles’ analysis of Memmott’s work is ‘communification’, a word derived from the combination of ‘communication’ and ‘commodification’. Thomas Dreher mentions this phenomenon in response to ‘Lexia to Perplexia’ as such: “Communification constructs a "body" which exists as a communication process in data streams called or initiated by users at terminals.” (Dreher 2004). To him, commodification is a process of meaning inscription and communication is the sum of occurrences taking place through this inscription. This derived term, if subjected to be transferred to the context of product design, is quite beneficial in order to represent the process of commodification through communication. Here communication as in the framework of this thesis study which has been mentioned in the Introduction, stand for both the communication between the user and the product and the designer’s communication with the medium of production, which in this case is the computer mediated production techniques in reference to the concept of ‘operation’ by Manovich.

## **CHAPTER 5**

### **CONCLUSION AND DISCUSSION**

Throughout this study new media, with its terms, principles, with reference to Manovich, and related concepts are examined for possible contributions to product design literature. During this examination of transformation of media, mostly under influence of the emergence and increasing availability of digital technology, three main areas of communication in the context of product design has been chosen, which are: The medium that allows the communication of the user with the product, the medium that products employ to operate and finally the medium used for the design process. The framework of this study has also been established through these three perspectives.

The first and the second perspectives have been discussed in the third chapter. In the Introduction it was stated that these two perspectives are intricately related to each other. So, throughout the third chapter various effects of emergence of new media technologies on field of product design concerning the communication media between product and user and the operational medium of the product, have been discussed in parallel to each other. One conclusion drawn through these discussions was the exploration of the tendency to design products like body extensions. This observation is also supported by the scientific history of media technologies drawn by Kittler where in the end he mentions about the externalisation of the human organs and mind. This track led the study to focus on the communication media between product and user, so the product semantics as well. It was also concluded that as the communication and the operation media changes, product semantics, in classical sense depending on visual and tactile communication between product and

user, becomes obsolete. Through this perspective, new media terms and concept should be employed in product semantic discussions. Product semantics has been found as the most effected field of research in the context of product design.

Literature review on product semantics and examinations on the scope of objects examined in the contexts of medical prosthetics, wearable electronics and in general new cultural objects lead to an assumed conclusion. It is that, the product semantics as a visual language is replaced by interaction via an interface, and interaction, where premeditated information flow is its main constituent, has the potential and the tendency to be replaced by the direct (neural) connection between human and machine, in other words flesh-machine connection.

The third perspective of the framework, which conceives new media as design and production media, was scrutinized in the fourth chapter. This examination mainly held through three main points, which are visualisation, production and logic of selection. From the visualisation point of view it is concluded that the with the emergence of new media technologies the forms, which can hardly be created non-algorithmically may be created by algorithmic manipulation techniques and dynamic forms are achieved. From the production point of view it was concluded that the new media technologies for production, such as rapid prototyping, provides the opportunity to produce similar form with slight differences with economic feasibility. This leaded the discussion to production of pre-industrial age. Last perspective to discuss new media as design and production media was the logic of selection. It is concluded that, logic of selection by means of design process in digital media brings along the concept of 'bricolage' as in the form offered by Strauss.

New media and its main constituent, digital media, is a distribution platform as well. Popular new objects like blogs, websites or CD-ROMs function as mass media networks. People are joining these networks with designed identities, which are subject to cultural exchange. This occurrence launches a new cultural research field in the context of new media and there may be found various interventions in product

design literature belonging to this new field. On the other hand investigations in this new cultural field requires an extensive cultural research on identity and cultural aspects of design and this research is found to be beyond the scope of this study and it may be regarded as a further study in the field.

Another further study related to this study may concern sustainability as an issue for new cultural objects in the context of emerging new media technologies. Minimum energy products both by means of production and consumption of the product may fall into consideration with the emergence of immaterial production.

In the beginning of this research, one of the ways to investigate the new media in the context of product design was stated to be handling new media as design media, in other words taking new media products as design tools. But afterwards, it has been seen that new media is not only a design media but also production media for product designers. The reasoning that justifies this idea can be constructed via two distinct ways. First, the emergence of real time and computer mediated production technologies allow designers to work in an environment where design and production facilities are integrated such as CNC systems. Second, new media objects defined by Manovich to represent a set of immaterial objects are being categorised as products of the post-industrial age and it is obvious that new media is the production medium for those products. These objects are usually examined by the doctrine of HCI. Considering that HCI (Human Computer Interface) is an interdisciplinary field of research having its roots in the ergonomics, cognition and computer science while these areas are beyond the scope of this thesis study these objects are also beyond the scope of this study as well. But it should also be noted that HCI studies in the context of new media, has provided valuable information and types of approaches to analyse the computer mediated new cultural objects.

Throughout the investigation on the institutional history of new media it has seen that artistic institutions are also working as research centres focused on the media technologies, named by Schwarz as media engineering, which are searching for various creative applications of developing media technologies. The notion of artist

scientist, today mainly exists within media art. In the post-industrial age computer freak-artists replace the genius mechanical engineer-artists of the industrial age. The outcome of the practical research carried out in these institutions and publications by them are valuable research sources for the product design enquiries.

The aims of this thesis imply an analysis of the components of product design today in a digital world - creativity, collaboration, research, analysis, styles, and the digital means, which lead to the an erosion of conventional distance between the real and the virtual.

In one sense, transformations of media into new media remove certain artefacts from material culture. This occurrence brings along the necessity of an accurate and abstract analysis of media forms and a more deliberate construction of them for specific tasks. Reading an online newspaper instead of buying a hard copy, one may exemplify this situation. In other terms, the digitization of media replaces the media artefacts of material culture with different artefacts of digital culture, which may be called as gadgets, with reference to Baudrillard, and this brings along the necessity of analyzing them with the new terms of new media. In order to exemplify this occurrence the famous movie titled 'Minority Report' may be recalled. Daily life in 2050's portrayed by director Steven Spielberg offers a kind of flexible LCD newspaper. This imaginary product is also examined in the context of gadgets today on web site titled 'admit-one' as:

Remember that sheet-thin USA Today tabloid with its moving ads and content in Minority Report circa 2057? While Hitachi's breakthrough (for now) is confined to just 80x80 dots in 1.4 inches, the reality of such a flexible LCD newspaper may be closer than we imagine. (Admit-One, 2004)

This product (digital paper) may be regarded as the artefact of the digital culture, which replaces media artefacts of material culture. In this case media artefact of material culture can be named as hard copy newspaper.

One of the most significant outcomes of this study is the result of the investigation carried out on product semantics in parallel with new media technologies. The motivating reason for this investigation is the transformation of the communication medium between the products and humans with the emergence of new media technologies. As a result of the comparative survey between Sony Walkman and Apple iPod it is seen that product semantics terminology is not enough to discuss the interface of the new computer mediated cultural objects. Furthermore, (concerning the narrowing gap between humans and products) cyborgs, not as a fantasy but as an amalgamation of human and machine in a realistic sense have been scrutinized and in one sense they are defined as the restructured users for the products of the post-industrial age and in the other sense they represented the obsolescence of product semantics.

Throughout the study held in the context of product semantics under the influence of new media technologies cyborgs represented the amalgamation of human and machine and restructured users of the changing environment. Remembering Haraway's cyborg manifesto and taking a brief gaze at the cyborg literature it may be seen that this amalgamation of human and machine also launches new socio-cultural discussion. The 'designers' of these 'products' integrated to flesh and neural system are thought to be in the centre of these discussions.

It should be noted that new media is a critical term. It stands for a number of media, which are obliged to keep on being new. Even though Manovich defines and theorizes in the context of digital technology, due to media-technological developments the emergence of new (newer) media depends not only on digital technology but something else as well, say, genetic, suprachemical or nanotechnology. It is also mentioned that, with reference to McLuhan, content of a medium is always another medium and one day humanity somehow transfer its knowledge to another medium and will define some other new media.

Media-specific analysis, however mainly discussed with reference to digital technologies throughout the study, is a significant approach for the prospective

technologies like genetic modification or transgenetic engineering. It can be argued that in the foreseeable future these technologies will be available for design and production media. Dormer mentions that the promising potentials of biogenetic processors and the art collectives like 'Critical Art Ensemble' dealing with GE/GM (Genetic Engineering / Genetic Modification) technologies are evaluated in the context of media art. It also should be noted that they critically contextualize the event that follows by problematizing various elements of new reproductive technologies. With this availability the necessity to discuss and theorize their modalities will arise as well. For today these discussions are held through science fiction movies, which do not only have the claim to portray a future world but also has the effort to create a fantasy environment. A just fit example for these discussions can be the one done by Kurtgözü in the context of product identity: He defines "mobile personal communicator devices or similar gadgets whose identity can not be established in either functional or formal terms" as 'chimeras' where chimera is defined as "an individual organ or part of consisting of tissues of diverse genetic constitutions" (Kurtgözü 2001). He also refers to Cronenberg's movie *Existenz* (1999) to exemplify these products. It is also obvious that some kind of a communication will be essential between products and users, and there will be various media technology for design and production whatever the media technology is in command, so at this point examining the relationship between design and technology through media-specific analysis is a valuable effort to further enhance the communication between product and user. The same logic holds for concerning the new media as design and production medium.

One of the most important motivating approaches to make an examination study of the relationship between media and design, as a meaning inscription process, has been the famous maxim of McLuhan's '*medium is the message*'. In the beginning of the fourth chapter it was stated that the examination of new media as design and production media is an indirect approach where Hayles claims that the medium and work, due to meanings they hold, are detachable. After detailed observations and in the light of the discussions carried out in the fourth chapter, it may be stated that McLuhan's approach directly holds for the investigation carried out in the context.

This study, in general, tried to prove that a source for a new medium is another medium both by means of content and technology, but it also has shown that the path of development of the media technologies is unpredictable and it takes a lot of time for these technologies to gain a theoretical background in theory both by means of design and production medium. By the examination on scientific history of media technologies, it is seen that it has its peaks due to scientific inventions of the age, and after every peak a ‘theoretical’ gap between technology and design broadens. Product design practice is not just a matter of applications of technologies offered by the scientific research. It is one of the motivations and conclusions of this study that media studies in the context of product design practice narrows the gap between design and technology in the post-industrial age.

Recalling the example given in the Chapter 4, language of the new media is nothing but a creole when it faces the language of the tangible products. The code and semantic language of the products come into contact, so in order to understand the nature and the modalities of the new cultural objects designed under the influence of new media technologies or to employ these technologies for the sake of communicating with its user, product designer should speak and understand this creole or even has to create his or hers.

In Introduction it has been mentioned with reference to Manovich and Barthes, that a new media object consists of discreet units and this structure also is the essence of communication. So, designing within a media of communication is nothing but a communication, commodification through communication. This communication may occur both in between the product and the user or the designer and the product. Manovich would probably call it a process of transcoding.



In the post-industrial, communication age where the *immateriality takes command*<sup>15</sup> for the designers, material studies, even for the material objects, media studies should take its proper place.

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<sup>15</sup> A borrowed phrase from the article titled “Immateriality Takes Command” by Marco Diani. Diani notes that this title has reference to Giedions’s book titled “Mechanization Takes Command”.

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## **APPENDIX A**

### **PRESS RELEASE FOR APPLE IPOD**

#### **Apple Presents iPod**

CUPERTINO, California—October 23, 2001

#### **Ultra-Portable MP3 Music Player Puts 1,000 Songs in Your Pocket**

Apple® today introduced iPod™, a breakthrough MP3 music player that packs up to 1,000 CD-quality songs into an ultra-portable, 6.5 ounce design that fits in your pocket. iPod combines a major advance in portable music device design with Apple's legendary ease of use and Auto-Sync, which automatically downloads all your iTunes™ songs and playlists into your iPod, and keeps them up to date whenever you plug your iPod into your Mac®.

“With iPod, Apple has invented a whole new category of digital music player that lets you put your entire music collection in your pocket and listen to it wherever you go,” said Steve Jobs, Apple's CEO. “With iPod, listening to music will never be the same again.”

#### **Next Generation Player**

iPod represents the next generation of portable music players that store music on an internal hard drive, yet are only 20 percent of the volume of today's hard drive-based players. iPod stores up to 1,000 CD-quality songs on its super-thin 5 GB hard drive,

and features up to 20 minutes of shock protection for nonstop playback when running, biking or other activities.

iPod's built-in FireWire® port lets you download an entire CD into iPod in under 10 seconds and 1,000 songs in less than 10 minutes—30 times faster than USB-based players.

iPod plays up to 10 hours of continuous music, powered by its rechargeable lithium polymer battery, and recharges automatically whenever iPod is connected to a Mac, using power supplied over the FireWire cable. Every iPod comes with a compact, FireWire-based power adapter for traveling. iPod's high-capacity 5GB hard drive doubles as a portable FireWire hard drive for storing presentations, large documents, graphic images and digital movies.

iPod plays music in the popular MP3, MP3 VBR (variable bit rate), AIFF and WAV formats and can support MP3 bit rates up to 320-Kbps. Its upgradeable firmware enables support of future audio formats. For CD-quality sound, iPod is equipped with a high-output 60-mW amplifier that delivers 20 to 20,000 Hz frequency response for deep bass and crystal-clear highs. iPod's earbud-style headphones are built with neodymium magnets for enhanced frequency response and high-fidelity sound.

iPod also features a 160-by-128-pixel high-resolution display, with a white LED backlight to give clear visibility in daylight as well as low-light conditions.

### **Legendary Ease of Use**

Apple has applied its legendary expertise in human interface engineering to make iPod the easiest to use digital device ever. Simply rotate iPod's unique scroll-wheel with your thumb or finger to quickly access your entire music collection by playlists, artists or songs. The scroll-wheel makes it possible to hold and operate iPod with just one hand and features automatic acceleration when scrolling through long lists so you can find your music in seconds. iPod also features customizable settings such as shuffle, repeat, startup volume, sleep timer and menus in multiple languages including English, French, German and Japanese. iPod can display song data in any of these languages, enabling users to mix and match songs from all over the world.



## **Auto-Sync**

iPod's revolutionary Auto-Sync feature makes it easy to get your entire music collection into iPod and update it whenever you connect iPod to your Mac. Simply plug your new iPod into your Mac with the supplied FireWire cable, and all of your iTunes songs and playlists are automatically downloaded into iPod at blazing FireWire speed. Then just unplug and go. Whenever you plug iPod back into your Mac it will be automatically updated with your latest iTunes songs and playlists, usually in seconds. There has never been a faster and easier way to always have your up-to-the-minute music and playlists with you wherever you go.

## **Pricing & Availability**

iPod will be available beginning on Saturday, November 10, for a suggested retail price of \$399 (US) from The Apple Store® ([www.apple.com](http://www.apple.com)), Apple's retail stores and Apple Authorized Resellers. An iTunes 2 CD, earbud-style headphones, FireWire cable, and FireWire-based power adapter are all included. iPod requires iTunes 2.

Apple ignited the personal computer revolution in the 1970s with the Apple II and reinvented the personal computer in the 1980s with the Macintosh. Apple is committed to bringing the best personal computing experience to students, educators, creative professionals and consumers around the world through its innovative hardware, software and Internet offerings.

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## **APPENDIX B**

### **PRESS RELEASE FOR SONY WALKMAN**

#### **Sony Celebrates Walkman(R) 20<sup>th</sup> Anniversary**

TOKYO, Japan – July 1, 1999

Sony Corporation today celebrates the 20th anniversary of the Walkman(R). The first model, 'TPS-L2', was introduced on July 1st, 1979. For the past 20 years, the Walkman has created a new global culture of "enjoying music any where and any time". According to Sony's latest figures, cumulative worldwide shipments of the cassette tape Walkman are 186 million units, 46 million units for the CD Walkman, and 4.6 million units for the MD Walkman (as of the end of the fiscal year 1998). Before the Walkman was introduced, music could only be enjoyed through a stereo system at home or a car audio system. Sony Founder and Chief Advisor, the late Masaru Ibuka, who was then Sony Honorary Chairman, and Sony Founder and Honorary Chairman Akio Morita, then Sony Chairman, created the concept of the Walkman portable stereo as a means of enjoying personal music entertainment. The Walkman was created by eliminating the record function and a speaker from a conventional cassette tape recorder and instead equipping it with stereo circuits and a stereo headphone terminal. Market watchers, and even Sony employees, were skeptical about the profitability of this new product during its development. However the development team believed in the potential of the new market, and they launched the first model known as 'TPS-L2'. Two months after the launch of this product, the skepticism was completely wiped out, and the Walkman became extremely popular. In addition to promoting the concept of 'enjoying music any where and any time', Walkman was widely advertised by celebrities appeared in

magazines with the product. The Walkman became a new culture icon - a social phenomenon - with enormous support from young users.

Although the name 'Walkman' is now highly recognized throughout the world, there were some fundamental challenges in naming this new product. At the time of the initial introduction of the Walkman overseas, Sony sales companies abroad strongly opposed the Japanese-made English word 'Walkman'. The Walkman was initially launched as 'Soundabout' in the U.S., 'Stowaway' in England, and 'Freestyle' in Australia. However, the name 'Walkman' was eventually accepted overseas, as Walkman portable stereos became very popular in Japan and tourists visiting Japan from abroad started buying them as a souvenir. At this point, Mr. Morita decided to standardize the name of the product and officially announced that the name 'Walkman' would be used worldwide. In 1986, the word 'Walkman' appeared in the Oxford English Dictionary and officially became a new English word.

Headphones are essential to the Walkman concept. While the development of a Walkman personal stereo was proceeding, another research team was coincidentally developing lightweight headphones. Compared to conventional headphones that weighed 300 to 400g, the new headphones weighed less than 50g. Mr. Ibuka was aware of the remarkably lightweight headphones and decided to combine them with the Walkman in March 1979. As a result, the first Walkman model 'TPS-L2' was launched with the headphones model 'MDR-3L2', weighing only 45g. Since then, the development of headphones have continued to evolve, including an inner-ear type model known as "N\*U\*D\*E" in 1982, egg-shaped headphones "eggo" in 1992, a behind-the-neck Street Style headphones in 1997. To date, 472 million units of headphones have been shipped (as of the end of the fiscal year 1998, including those bundled with the Walkman personal stereos).

The Walkman was originally introduced as a compact cassette tape player, but with the emergence of new music media, the Walkman has expanded its product lineup. It includes the Sony Discman\* portable CD player 'D-50' in 1984, DAT Walkman 'TCD-D3' in 1990, and MiniDisc Walkman "MZ-1", 'MZ-2P' in 1992. Currently the development of "Memory Stick" Walkman compatible with the new chewing gum-sized IC recording media is in process.

From the Japanese product line introduced between October 1997 and March 1998, the name "Discman" was changed to "CD Walkman" in order to be consistent with other personal audio devices. Electronic book players and portable DVD players continue to use the name "Discman".

Over the years, the Sony Walkman has dramatically changed the way the world listens to music. The Walkman made music listening a personal experience, by providing people with the freedom to enjoy music regardless of place. Sony will continue to represent revolutionary portable audio products that carry forward the legacy of the first Walkman.

Sony Corporation is a leading manufacturer of audio, video, communications and information technology products for the consumer and professional markets. Its music, pictures and computer entertainment operations make Sony one of the most comprehensive entertainment companies in the world. Sony recorded consolidated annual sales of over \$56 billion for the fiscal year ended March 31, 1999. Sony Corporation's homepage URL: <http://www.sony.co.jp>.