A PERCEPTIONAL MODEL TO UNDERSTAND IMMERSION

A THESIS

SUBMITTED TO THE DEPARTMENT OF

COMMUNICATION AND DESIGN

AND THE INSTITUTE OF ECONOMICS

AND SOCIAL SCIENCES

OF BİLKENT UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF ARTS

By

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June, 2009

I hereby declare that all the information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that as required by these rules and conduct, I have fully cited and referenced all material and results that are not original in this work.

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ABSTRACT

A PERCEPTIONAL MODEL TO UNDERSTAND IMMERSION

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June, 2009

The aim of this study is to offer a new model for the concept of immersion based on the process of perception in humans. The motivation behind the study is that although the concept of immersion points to an important experience both in various media and daily life, current approaches to the concept do not provide an analytical framework needed for understanding it. This study offers a cognitive and parameter based model which is based on the perception theory put forward by Henri Bergson in his book Matter and Memory. The model makes possible the analysis of the concept of immersion in terms of various cognitive and physical factors.

Keywords: Immersion, perception, new media, virtual reality, virtual, actual, immersive

ÖZET

ALGIYA DAYALI BİR "IMMERSION" MODELİ

C. Armağan Alper

Medya ve Görsel Çalışmalar
Yüksek Lisans
Tez Yöneticisi: Assist. Prof. H. Murat Karamüftüoğlu

Haziran, 2009

Bu çalışmada "immersion" kavramına algıya dayalı olarak yeni bilişsel bir model getirmek amaçlanmıştır. Çalışmanın temel isteklendirme kaynağı "immersion" kavramının gerek medya alanında gerekse günlük hayatımızda önemli bir tecrübeye işaret etmesine rağmen, mevcut yaklaşımların kavrama analitik bir model sunmamasıdır. Bu sebeple çalışmada, Henri Bergson tarafından Matter and Memory kitabında ortaya koyulan algı kuramı temel alınarak "immersion" kavramına dair bilişsel ve değişkenlere dayalı yeni bir model önerilmektedir. Böylece "immersion" kavramının farklı etkenler açısından çözümlemeli olarak değerlendirebilmesinin önü açılmaktadır.

Anahtar Sözcükler: "Immersion", algı, yeni medya, sanal gerçeklik, sanal, gerçek, "immersive"

ACKNOWLEDGEMENTS

I must say that this thesis is written in an especially difficult period of life in which I had to struggle with various issues. Therefore, all of the thank-you words in this section should be considered with the most sincere meanings they can imply.

First of all, I would like to thank to Assist. Prof. Dr. H. Murat Karamüftüoğlu, my supervisor. Without his support and understanding, which is beyond a supervisor could grant, it was impossible to complete this work. Thus I owe special thanks to him. Secondly, I should thank to Assist. Prof. Andreas Treske both for his contributions to my study and for the student-friendly environment that he has setup in the department as the chairman. I should also emphasize the helpful manner of Mrs. Sabire Özyalçın, our department secretary, which always relieved me about formal procedures and which kept me involved with the department.

Additionally, I thank to my family for always trusting and supporting me during my study as they did for every difficulty that I have faced in my life. Finally I especially thank to little Nil Alper who always met her uncle with a smiling face although her uncle visited her very infrequently due to his everlasting busy works.

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CHAPTER 1

1.1. Introduction

The immersion concept has an important place both in our real lives and during media consumption. Detailed discussion of the definitions of immersion is given in Chapter 2 but the main notion that we could derive from immersion definitions available in the literature is that the person feels surrounded with the stimuli arriving from an immersive medium. Even the conditions are fictional the person experiences them as if they are real.

The importance of the immersion concept persists to date, especially because of digital systems/media. As it will be discussed in Chapter 2, immersion is almost the most crucial concept for media labeled under virtual reality systems (VRS). However, it is not limited to VRS. This situation, on one hand signals the importance of immersion in media consumption. On the other hand it means that the scope of immersion in human life is very wide. In this study, the concept of immersion is given the largest possible scope implied in different approaches to the concept.

The fact that immersion concept is involved in the discussions of various forms of media, enables us to notice the importance

of the concept and its wide scope. However, as it is discussed in Chapter 3, current approaches to the concept are not sufficient to provide a solid model. The lack of such a model makes us face several problems about the concept. When these problems are considered, it is seen that the most important shortcoming of the current approaches is that they do not provide an explanation which is adaptable to the cognitive perception processes that underlie in every process between human and his external world.

In this study, to overcome the insufficiency of current explanations of the immersion phenomenon, a new immersion model, which is based on the philosopher Henri Bergson's perception theory presented in the book Matter and Memory (Bergson, 2004), is constructed. The details of the Bergson's model are discussed in Chapter 3. The new model is presented in Chapter 4. With this new model, it is possible to explain the processes that lead the human agent through the immersion process. Chapter 4 includes the details of the model and derivation of parameters that are used in the model.

As it is discussed in Chapter 5, with the new model, we can describe a special mental state of the person that corresponds to an immersive experience. This cognitive model makes it easy to avoid the problems emerge in the current approaches to immersion in the literature. Chapter 5 presents an analysis of how these problems are resolved with the new immersion model. In addition to this, explanation of the phenomenon of immersion with such a model facilitates understanding of which

factors are involved in the immersive experience during the process of interaction between medium and the person. Detailed discussion related to the maintenance of immersion from the media's point of view is also discussed in Chapter 5.

CHAPTER 2

2.1. Popularization of Immersion Concept

In this study, immersion concept is investigated in a broad scope in order to develop a comprehensive approach. As we will see in the next sections, most of the current approaches to the concept are constructed in the context of particular situation and/or medium. However, in our approach the immersion concept will be based on basic human perception processes applicable to all situations. This will lead our discussion to be more generic such that the experiences involved in the concept could be applicable to any area in human life in which a certain type of perception occurs. On the other side, before carrying our discussion further, it is appropriate to make reference to the distinctive historical developments that contribute to current understandings of immersion. Without this knowledge, it is difficult to build a realistic and practical model. Therefore, relevant historical developments will be the focus of this chapter.

It can be observed that, the concept of immersion is mostly mentioned together with certain media types (such as digital media, video games), and it is considered to be the characteristic of these media types. These media types appear

as the systems that simulate "real life-like" experiences through computer support.

If we try to unite these computer-supported media examples under the same framework, the most distinctive term that we come up with is the "virtual reality" which is in fact an carelessly selected and used term. This is because the term "virtual" embodies a wide range of connotations, such as "fake, simulation, counterfactual, and potential". Various meanings of it are discussed in Chapter 4 (Table 1). In this chapter, instead of getting further into the discussions about appropriateness of the term "virtual reality", I would like to make clear that the phrase "virtual reality" is used, in this dissertation to denote only a particular media type, computer supported simulation systems rather than various meanings of the concept of "virtual" found in philosophical discourse.

If we consider the term virtual reality as the certain technological devices or more generally any kind of media that attempt to duplicate the "reality" and provide opportunity for real-life like experiences, we have to consider almost a 50-60 years concrete history.

The following parts of this chapter focus on the prominent works in the history of virtual reality and innovations that are created as a result of these works.

1955: Morton Heilig — Sensorama

The first distinct example in the history of virtual reality is a system called Sensorama introduced by Morton Heilig (Packer and Jordan, 2002, p.240). In his study, Heilig wanted to turn cinema, which was only based on the visual and aural senses, into a more comprehensive media that appeals to senses of smell, touch as well as taste. By this means, by controlling all the senses of the audiences, Morton Heilig believed that it was possible to create the feeling of being inside the story of the cinema indeed. The basis of this idea was the conception that the consciousness of the person is formed by analyzing the data received from every sense in brain and that according to this, a media which does not involve all senses, cannot provide proper feeling of being included in the cinema.

1965: Ivan Sutherland — The Ultimate Display

Ivan Sutherland was one of the people who provided a utopic definition of the role that computers played part in creating virtual reality. According to him, computer could transform and present the digital data and mathematical symbols into any form desired (Packer and Jordan, 2002, p.253). The idea of "ultimate display" was the artificial environment in which the whole experience of existence was controlled by the computer. According to Sutherland, even the reality itself could be fully simulated in a computer environment. In addition to this

notional contribution, Ivan Sutherland made a tangible contribution to the field through his head-mounted display with 3D-like graphs that he developed in 1966. With his prototype Ivan Sutherland aimed at transforming the meaningless symbols into a media which surrounds the participant like real life.

1984: William Gibson – Neuromancer

In those years when the concept on virtual reality was unknown, William Gibson added a breath of fresh air and long-sightedness to the field though his novel Neuromancer. With his term "cyberspace", he paved the way for the idea of virtual reality in which people felt themselves mentally exist in a parallel world. The most significant contribution of William Gibson is that he carried the concept of virtual reality beyond a system that deludes the human mind with real-life like visual data. In Neuromancer, the concept virtual reality becomes a multi-dimensional parallel life zone in which human can transform his existence into a new identity and culture (Packer and Jordan, 2002). The most important indicator of contribution is that starting with Neuromancer, the concept virtual reality has become associated with such new terms as cyberspace, cyberpunk, cyber crime, cyber law, cybersex etc.

1989: Scott Fisher – Virtual Interface Environments

Scott Fisher was one of the people who considered Virtual Reality not only a medium to be watched but also a medium to be interacted with and to change its content by the audience. He was one of the contributors to change viewers into users. In order to provide interactivity and sense variety, beside the head-mounted screen that enables a profound view with the stereoscopic pictures, he developed systems that include equipments such as headset, microphone and data glove. In his system, it was possible for the participant to view in a simulated 3D environment, to hear the sounds of the simulated environment, to transfer his own voice to the environment and to hold the objects in it. A different aspect of Scott Fisher's contribution is that he has envisioned the possibility of the existence in a distant environment; namely, telepresence (Packer and Jordan, 2002, p.258).

1993: D. Sandin, T. Defanti, C.Cruz – CAVE: A Room with a View

The Cave system was an interactive virtual reality environment which was designed to provide the participants a mobile simulated 3D environment. Opposed to previous virtual reality systems, the CAVE system requires less heavy equipment to be worn by the participants. The Cave was a 3-cubic meter room, which was enclosed with 3D animated pictures on its walls. Furthermore, the room was equipped with a 3D sound system. The

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only equipments that the participant had to use were stereoscopic glasses and a wristband inside the room. The glasses enabled the participant not only to obtain 3D image but also enabled the system to follow the motions of the participant. By this way, the participant could manipulate the simulated in the cave through head and wrist movements. One other advantage of this system was that it allowed more than one participant to enter the same room and share this experience simultaneously. Hence, the created virtual reality environment was turned out to be more realistic by rendering it to a common experience among participants (Packer and Jordan, 2002, p.286).

1997: Char Davies – Osmose

With his Osmose Project, Char Davies developed a virtual reality system in which the participant could interact with his whole body in a simulated deep-water environment. In Osmose, the participant was provided with head-mounted screen, data gloves and interactive sound similar to the previous virtual reality systems; however, in Osmose in addition to those equipments there were sensors attached to the participant's body. So that, the participant could determine his directions through his breathe and body balance while wandering inside the simulated environment. As a result of this project, a novelty brought to the scene in virtual reality systems which made it possible to interact with the simulated environment with the whole body and provided more

natural means of self expression (Packer and Jordan, 2002, p.293).

2.2. Rethinking Immersion

If we observe the developments in virtual reality systems throughout the history, which are mentioned in the previous part, we can notice that focal points are always on the immersion concept. The main indicator of this observation is that every innovation carried out aims to create more convincing simulated worlds with more interaction capabilities.

The above briefly discussed virtual reality system projects have left a strong impression on the public. Brenda Laure observes the impact of virtual reality systems in her following words:

"*.. and the term 'virtual reality' had begun to spread out like an oil slick over anything new and sexy in the world of interactive entertainment..*" (Laurel, 1991, p.199).

Technology based virtual reality systems (VRS) are associated very closely with the concept of immersion. This necessarily results in directly relating the concept of immersion with VRS. However, if we consider the core notion of immersion, we see that the scope of the concept is much wider than just relating to the relationship between humans and technological media. As a matter of fact, Ken Pimental and Kevin Teixeira

include different type of media to the discussion of immersion with following words:

> " *..the subject is absorbed when reading a good novel or playing a computer game in immersive state"* (Pimental and Teixeira, 1993, p.15)

Additionally, Marie Ryan applies the notion of immersion concept along with the wider concept of "virtual reality" to narrative works (Ryan, 2001). The possible expansion of immersion can also be found in Janet Murray (Murray, 1998) and Brenda Laurel (Laurel, 1991).

Starting from the very beginning, we should remember that word immerse means *"dip or submerge in a liquid"* (Oxford online dictionary). According to dictionary, an extended metaphorical meaning of the term is *"involve oneself deeply in an activity or interest"* (Oxford online dictionary). Then, the phenomenon that we try to allude to immersion basically means that our perceptions and behaviors are encircled by the conditions of a particular context and conditioned according to these circumstances. Behind the definitions of immersion suggested in different contexts, we can observe this common notion.

2.2.1. Different Approaches to Immersion Concept

Transportation and Projection of Body

The English writer Charlotte Brontê articulates her view point about the concept immersion in her book Shirley as in the following statement:

"You shall see them, reader. Step into this neat garden-house on the skirts of Whinbury, walk forward into the little parlour -- there they are at dinner. [...] You and I will join the party, see what is to be seen, and hear what is to be heard." (Brontê, 1849, p.9)

When considered the level of participation that the writer envisages for the reader, it is seen that this does not fall short of the ambitions of the technological examples. This suggests that the term virtual reality, which is closely related to concept of immersion, can exist apart from technological systems. This situation, as we try to do in this study, supports the necessity to consider the arguments about the concept immersion as more general beyond certain technical possibilities.

According to Marie Ryan, Charlotte Bronte's approach to immersion is the projection of the reader's body into fictional world (Ryan, 2001). This literary approach of Charlotte Brontê enounces clearly that we want to place immersive experience differently from an ordinary media consumption experience. According to this, we can understand

that for immersion, it is essential that the content presented to the reader or participant be as much detailed and alive as it is in real life.

Another approach similar to above was the one that Richard Gerrig put forward about the terms "transportation" and "travel". According to Richard Gerrig, for immersive experience to take place, readers should be distracted from 'the consciousness' of their existing state; they should be evoked that they are in a different environment than they are actually in (Gerrig, 1993). The idea of transportation and travel suggests the process of extrapolation as well as enabling us to notice the emergence of immersive experience as a process. This aspect gives us a clue about the existence of a gradual disconnection from ordinary life which leads to a "magical" immersive experience.

Losing Yourself and Being Over a Threshold of Involvement

Victor Nell, in his book called "Lost in a Book: The Psychology of Reading for Pleasure" defines the immersive experience via the idea of losing consciousness (Nell, 1988). The idea of losing consciousness purports breaking off from the real life as in the other views about immersion discussed above. Moreover, due to the fact that this idea denotes a psychological situation occurred in people, it enables us to

appreciate the impact of immersive experience on the person better. Therefore, it gets easy for us to recognize that the person, rather than being a passive and simple audience in the fictional world, is in a situation where he is affected deeply by the things he is experiencing.

By Victor Nell's approach our focus in the immersion concept shifts to the person/user himself. This propensity grows even stronger with Kevin Pimental and Kevin Teixeira's definition of immersion. According to Ken Pimental and Kevin Teixeira, immersion means that the participant gets involved in the world built up in a fictional content "beyond a certain limit" (Pimental and Teixeira, 1993, p.15). Another different view point introduced by this approach is that for the immersive state, the presented content does not have to exactly imitate the real world. Rather, the important point is to prevent the participant for a while from believing that the things presented in the content are fictive.

The idea we obtained from this approach makes us to see that the participant is in an active position during the immersive experience. In addition, this view enables us to realize the fact that the important factor in the process of immersion is actually to move away the participant from the connection with the real world.

A parallel approach to the participant's breaking off from the real world in immersive experience is articulated by Martin Lister (Lister, 2003). Martin Lister defines the immersion concept as the experience of being in a world of fictionalized

images. In order to fulfill this, the mental distance between the participant and images should disappear and the world of images should surround the participant. According to Martin Lister, the extended definition of immersive experience for technology-based "New Media" is discerned as the participant's losing his sense of being outside the fictional world.

Scope of Immersion in This Study

When the above discussions on immersion are contemplated, it is seen that most of the definitions are addressed by certain people according to their own field of interest. On the other hand, if we look at the notion or consider the general approaches in other media types, we understand that the immersive experience is a special mode of perception peculiar to human nature rather than possessed by certain media types. It is no doubt that this experience can occur in dissimilar ways in different media types and those experiences can come through in different ways. However, the focal point of almost every argument on immersion converges around a certain notion. Just like the metaphoric attribution to the dictionary meaning of immersion, the focal point is to mentally surround the participant by a certain atmosphere (or mental state) and condition the behavior and perception of the participant partially or completely in accordance with the context of the atmosphere.

In this study, immersion will be evaluated as a specific perception mode peculiar to human nature as mentioned above. Consequently, we will try to formalize the immersive experience at a level in which it can be applied to more than one area irrespective of particular circumstances caused by consumption of a certain media type.

CHAPTER 3

3.1. Importance of Immersion

The concept of immersion has been a main key word for many media types and often expounded by many intellectuals. In this study, since we will extensively focus on the concept, it would be helpful to define why the concept of immersion has a significant role in our life.

The other terms related to the concept of immersion from the literature, are the concepts such as perception, consciousness, sense, impact, etc. Although there are a wide range of words defining the relationship between the human and the outside world, why there is a need for a term which in fact means diving into a liquid? In this chapter, this will be the fundamental question to be answered.

What is specific to the experience of immersion is that beyond the discrete perceptions and senses, the consumer visualizes the complicated structure as a whole and internalizes the content rather than observing as just an outsider. By this means, the objects, relations between objects and the events that are presented in the content is transmitted to the human more effectively as a whole.

When we consider the question of how the human can see the presented content by internalizing it as a whole, it is important for the content to be making sense in a way that human can understand. Secondly the content should be convincing enough for the human to forget about the world outside the content. This necessity can be somehow met in different ways by all the media types, which are related to immersion concept. For instance, while Charlotte Brontê is explaining the immersive experience that she suggests to the reader, she attributes to her characters in her novel features of living just like in the real world (Brontê, 1849). On the other hand, when look at the computer-supported virtual reality systems, it is seen that the concern of relational integrity and imitation of realism comes into the prominence as evidenced by the equipments developed such as 3D views, headphones, microphones, data gloves etc.

If we consider the term immersion generally, we notice that the real world can also be considered as an immersive flow. Moreover, it can even be said that the perfect immersive experience is the real world itself. For example, a person going to the hospital for treatment will concentrate on a specific theme which are the reasons taking him to the hospital; his previously formed ideas about the hospital and his observations in the hospital. Thus, this person will interpret his relations with the outside world in accordance to this theme as a whole. For instance when he hears a scream while waiting in the queue, he will think that somebody who needs treatment might have screamed. Consequently, perception

of the selected stimuli in the immersive media is naturally achieved. As a matter of fact, if we consider the aim of the immersive media to be as efficient as the real world, it is clear that same sort of process takes place in immersive media.

As stated in the first chapter, throughout the study, the immersion will not be considered to be peculiar to just one media type. Within our general approach to the concept even the real world experiences can be modeled without any difficulty. When viewed from this aspect, the immersion concept takes an important role to play in any area where we can identify mental experiences, internalization and feeling of being surrounded by a certain theme. Among these, we can consider the "real world" as the absolute and natural environment to have immersive experience. In this regard, immersion turns out to be the key-word of how we condition ourselves in certain circumstances beyond the processes of discrete perception and sensations. As a result, for media aiming at providing the consumer with the feeling of immersed with certain deepness, content richness and excitement of flow, the immersion becomes important element in the process of media design, and evaluation as well.

All of these issues persuade us that the concept of immersion fills a huge gap in the literature and studies on immersion can contribute much to our lives.

3.2. Issues that Arise in Current Approaches to Immersion

When we analyze the immersion approaches mentioned in the first chapter, it is possible to have an intuition about the concept. While talking about the concept until this part of the study, we have already made use of the definitions extracted from those approaches. After analyzing the concept in detail we can easily notice that immersion has a fundamental closeness to other concepts like perception and sensation, which underlay every kind of relation of the human with the world outside him. However, it is difficult to find a clear and solid definition on the immersion concept based on cognitive processes in the literature. For instance, if our topic in this study had been perception or sense instead of immersion, it would have been possible to mention about cognitive theories, physical and biological researches rather than intuitive approaches.

Even though it is a fact that the term immersion denotes a more complicated and versatile experience than other terms, it is inevitable to think that it needs to include the main processes such as perception and sensation which emerge directly from the relation of the human with any environment or object. However, although the available immersion approaches enlighten us in an intuitive way, they are not sufficient to make a connection between immersive experience and these underlying processes. The reason for this gap is that current approaches to the immersion concept mainly focus

on the subjective feelings that emerge as a result of the immersive experience. However these approaches do not satisfy us about the formation and dynamics of immersive experience. Therefore, we encounter a gap between the immersive experience and main perceptional processes. The main purpose of this study is in fact to introduce an approach to the concept of immersion based on the problems due to this gap. By this way, instead of relying on magic and romantic approaches, it can be possible to come up with a model which makes it possible to formulize the immersion concept and handle it from different perspectives without limiting the concept's scope.

Problem of Transportation and Projection of Body

In the first chapter, we indicated that one of the available immersive approaches was based on the metaphors of transportation (Gerrig, 1993) and projection (Ryan, 2001). Based on these metaphors, we can form many opinions about the state of being surrounded and being inside, which are inherent to the concept of immersion. Furthermore, we also indicated that with the transportation approach we can obtain clues on the additional processes about the emergence of immersive experience of the person throughout the interaction.

Even though the metaphors of transportation and projection in this approach make us closer to understand the core of the phenomenon of immersion, with this approach it difficult to handle actually occurring perception processes with a

cognitive perspective. This is because the metaphors cause us to visualize process as travel of the person into the immersive environment. However, main process of perception is constituted with the rebuilding the information (received by senses) related to the environment by transforming them to the person's mind as peculiar to the person.

Although this reverse viewpoint created by the metaphors of transportation and projection enables us to visualize the results of the immersive experience easily, it makes it hard to see the details in the penetration of immersive situation from outside to inside. In other words, this makes it difficult for us to see the effects of recreating the fictional world according to mental state of the person and the effects of the interpretation peculiar to the person. Thus, it does not provide us with the necessary concrete clues to identify the dynamics of the process of immersive experience. To avoid this problem we have to reverse the immersion process that we have formed in our minds based on these metaphors. As a result, by making use of transportation and projection metaphors it becomes harder to possess a cognitive understanding of the concept immersion.

Problem of Losing Yourself and Being Involved over a Threshold

One of the intuitions that we can have from the immersion approaches is that the person leaves his existence outside the

fictional world to which he is exposed and he internalizes the presented content in a way to feel the immersive environment as if it is reality (Nell, 1988; Pimental, and, Teixeira, 1993). In other words, the person should avoid his individuality that alienates himself from the immersive environment to which he is exposed.

Thanks to this approach, we recognize that we can focus on the change occurred in the mental state of the person during the immersion process, and how the person can undergo a remarkable conscious shift with the immersive experience.

The metaphors and the depictions in this approach take us a step further to understand the core of the concept of immersion whereas it leaves many questions to be answered behind. Among those questions are what it means to lose yourself, and through what parameters and values we can measure this.

It's indisputable that wherever they are, the human's perception and sensation of the environment involve as the innate brain and mind structure of the person, and his/her past experiences and characteristics. Whatever environment the human is surrounded by, this is accompanied with a certain awareness of it. Thus, when a person involves in a new environment, the new circumstances will be interpreted by the consciousness conditioned by the person's experience and personality. Overall, fake or real, the medium the person is exposed will be experienced by him on the basis of his mind's internal capabilities.

Due to the reasons stated above, when used alone, the condition of losing consciousness or being involved beyond a certain limit falls short. In these approaches, it is likely that the large-scale role which the consciousness accompanying the person plays is ignored. Therefore, in such immersion approaches, there are two main questions to be answered. The first one is how the immersion can be expressed as a special state without ignoring the cognitive state that accompanies the person. The second question is what parameters are needed to describe and measure the cognitive state of the person in immersion.

Problem of Using Immersion as a Success Measure

As stated in earlier, immersion has turned out to be a key term for many kinds of media. These media types distinguish themselves in a wide range of fields such as technology-supported virtual reality systems, books, theatres and music. The definitions examined earlier by Marie Ryan who considers the narrative as a field of virtual reality and immersion (Ryan, 2001), Janet Murray who considers the flood of mind experience emerging while listening to the music (Murray, 1998), and Brenda Laurel's conception of the virtual reality systems as theatre (Laurel, 1991), show the importance of immersion concept in different media.

The important role of the immersion concept in the media reveals two significant results. One is that immersive

experience has turned out to be a success criterion for the related media types. Accordingly, it is important for these media types to create immersive experience for the person and to what extent it manages to do it. The second conclusion is that creating immersive experience becomes a critical concern during the designing process for different media types. On the other hand, it is inevitable to think that the fact that we still do not have any cognitive description based on distinctive parameters and perceptional processes cause us to fall into the error in this field.

In order to have immersiveness as a success criterion, we need to have a clearer immersion model. This model should be able to exhibit the interplay between the person's individual mental processes and the media as external data on the person's feeling of being surrounded in course of the immersive experience. Unless we posses such a model, it will be difficult to differentiate to what extent the media examined enable the immersive experience. Thus, it also gets difficult to carry out an objective evaluation of the immersive media irrespective of the person. To set an example, a media work, which mentions events or experiences that people often have or easily visualize in their minds can create an immersive effect on the person more easily. In such a case, many shortcomings of the elements in the media content will be completed with the consumer's mental act. If we overlook the details of the media content and its structure when aiming this case, we can be led to judge the media work as successful in terms of immersiveness. On the other hand, another media

work which tries to create an unfamiliar experience in mind of the users can be considered as unsuccessful, although it may be richer in terms of content.

In the course of design of media work with immersive concerns, it is needed to think about how the consumers will be taken to an immersive state and how the immersive state will be kept stable and the media content will be conveyed to the consumer in an effective way. At this point, there is a need to focus on what parameters the immersion processes are based on and how the interplay and trade-off between these parameters occur as time passes. It is obvious that the approaches we reviewed earlier do not meet this need at all. Consequently, as in the other problems, a need arises for a formulation that explains the immersion process as manageable and traceable. Only through this way can explain how a media designer can organize the media elements to create in the consumer's mind an immersive experience and create more effective media works.

3.3. Perceptional Approach to Immersion

It has been previously discussed that although the term immersion has a very important role to play in our lives and in the field of media and it is a significant experience, we see that it causes arguments about many issues due to the lack of an acceptable cognitive explanation and a manageable model.

On the other hand, it is known that there are cognitive models about the sensation and perception concepts that are aimed at explaining the connection of the human with the outside. These models come from both biological and cognitive/psychological fields. One of the primary ways for giving a clear explanation of the immersion process is to base the concept on fundamental processes that we have cognitive models about. Therefore, the purpose of this study is to explain immersion process on cognitive processes that take place in perception.

Degrading the immersion concept to the fundamental perception level or interpreting it as an equivalent state of perception level will cause us to easily lose the track of the specific situation implied by the core notion of the concept of immersion. Hence, immersion should be considered as a special high-level mental experience, which is fundamentally based on the dynamics of the perception process. We can visualize the immersive process in terms of the hierarchy given in Fig. 1.
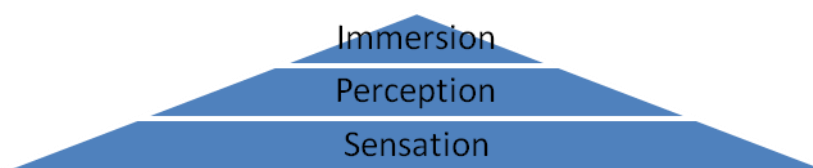

Figure 1: Fundamentals of Immersion

In Fig. 1, the sensation, which is depicted in the lowest level, refers to the process of transporting external stimulus from the senses (e.g. the eye) to the brain based on the

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biological and physical capabilities of human body. This process involves the biological transformation of external stimulus inside the body before starting the mental analysis of the content. Without discussing the sensation process in detail, in order to reach the concept of immersion, we will we will follow a short-cut through perception in this study.

There are many different approaches to the phenomenon of perception. However, throughout this study, the basic dynamics related to perception will be based on Henri Bergson's perception theory as it provides a rigorous explanation of higher-level perceptional processes needed in this study in modeling immersive experience. Details about why Henri Bergson's theory is appreciated for explaining immersion will be discussed further in the next sections. In the remaining part of this chapter, which ideas of Henri Bergson can be used for understanding immersion, why the perception theory of Henri Bergson has been taken as a basis of this study, and what kinds of contributions are needed to be made to Bergson's ideas will be clarified.

Henri Bergson and His Perception Approach

Even though Henri Bergson started his academic career as a mathematician, at the end of the 19th century and in the 20th century, he became one of the prominent figures in the field of philosophy and psychology, which he started to get interested in later on. Apart from his academic career, he was assigned with important duties in France-America relations

during the World War II and he also played a part in the establishment of the League of Nations, the initial form of the United Nations.

With his works, Henri Bergson became very popular in his time, but after the World War II, the impacts of his ideas started to decrease. However, in 1960s the attributions that Merleau-Ponty, Sartre, Lévinas and especially Gilles Deleuze made on Bergson's ideas brought him to the agenda again and refreshed the value of his ideas (Lawlor and Moulard, 2008).

Among the significant terms that Henri Bergson contributed are "duration" (Bergson, 1910), "intuition" (Bergson, 1946), "Êlan Vital" (Bergson, 1907), "pure perception" and "virtual-actual dualism" (Bergson, 2004).

In this study, among many other contributions that Henri Bergson made to different fields, we start with his ideas on perception. These ideas are included in his book "Matter and Memory" (Bergson, 2004).

Cycle of Perception

One of the keystones of Henri Bergson's perception approach is comprised of the model in which he uncovered the relationship between the human mind, the results of perception, and the data gained from the target object. The visual representation of this model is given in Fig.2.
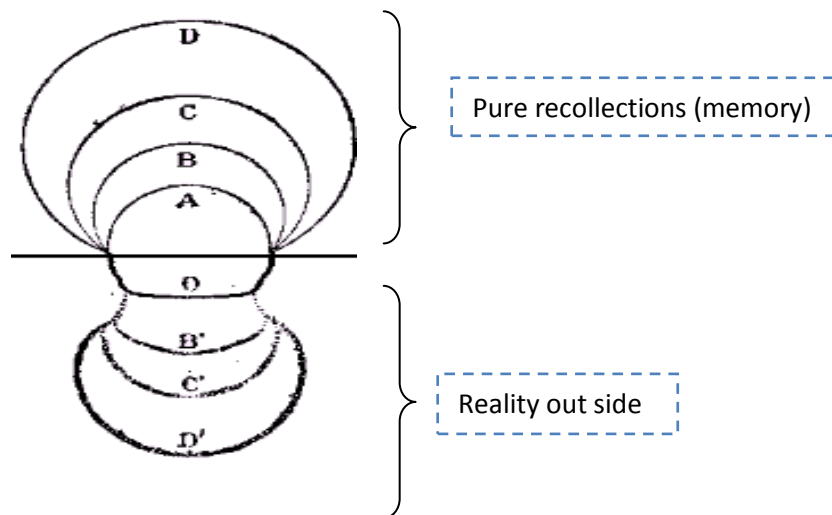
Figure 2: Perception Model of Bergson (Bergson, 2004, p.128)

According to Bergson's model, the area under the horizontal line represents the reality outside the person (Bergson, 2004, p.128). The half circle which is labeled as O represents the raw sensual data emitted from the object. Other half circles which are labeled as B', C' and D' represents the strata of reality. According to Bergson, in an effective perception process the person gains a deeper understanding of the target object, which is beyond the raw sensual data arriving to person. So, the area covered by the below half circles (B', C' and D') refer to what the person has gained insight about the reality. The area above the line however indicates the memory of person which is developed and still developing as a result of the person's recollections throughout his life. According to Bergson, collection of images in the memory cannot be controlled by will. These pure recollections are accumulated

involuntarily and are materialized in the mind when they are associated with the perceived images of brain.

The most important part of Bergson's model is the perception process that is expressed by the circles, half of which is placed above the horizontal line and the other half below the horizontal line. According to Bergson, the perception takes place as an iterative process as it is seen in the propagating perception circles. However the model in Fig. 2 should be considered as a general template for perception process. Bergson identifies two different types of perception which have different patterns based on the given template model. These types of perceptions will be discusses in the next section.

In the process of perception, after the first sight of the target object, the data collected from the object through the senses results in associations and interpretations in the mind. At the end of this mental process, the person gains a memory-image of the object in his conscious part of the brain. With this image, the person acquires a new attitude (disposition or physical and mental state) about the object and then reconstructs the object in his mind. As a result of this process, the data gained from the object through the senses starts a new association in the mind and this arise new images in the mind. So that even though the raw data coming from the object remains same, the person gains new views of the object throughout the process. Until the point is reached where there are no new associations brought to the mind of the

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person or he/she loses interest in the object (which means images which are irrelevant to the target object are brought up in the mind) the perception process goes on like this. In Fig. 2, the area covered by the upper half circles represents the expansion in images in memory as a result of associations brought up with the perceived object. The point that should not be overlooked is that the person acquires a new attitude after every circle and becomes able to recognize different aspects of the target object. By doing so although the object is same, the person gains deeper insight about the object. Therefore, the result of the perception prospers and in every cycle the person obtains different kind of images about the object.

In every step of the perception process, any image that arrives to the conscious part of the brain after mental associations causes the person to an "act", which in turn changes person's attitude towards the object. The term "act" in Bergson's model does not directly refer to physical action of the person. Rather than that Bergson refers to event of something being actualized in the conscious part of the brain of the person. In other words, some image in the uncontrolled part of the memory is being brought up to present perception. Detail of the actualization concept in Bergson's theory is further discussed in the next chapter.

According to Bergson, the person's power of perception of the target object is related to the whole area embodied by circles above the horizontal line and its reflections on the memory

(pure recollections) is represented by the area below the horizontal line at the end of this cyclical process. The more the person can relate the sensual data acquired from the object to the wider area in the memory, the more rich meaning he/she can get and thus becoming more creative. The wide circles on the upper half of the diagram means that the person is returning back to his past and so breaking of the present perception. Since, in this case the person gathers more associations about the object in his mind; he has to spend some time which is due to the gap between the moment sensory data arrives to mind and the moment when the images in his recollections are associated with the object. When the perception process ends with a smaller covered area above the horizontal line and with less number of circles the person stays more in the present time and becomes ready for the next perception activity.

Habitual Recognition and Attentive Recognition

According to Bergson, the perception process explained above can occur in different dimensions in accordance with the impact created in mind. The end point on one side of these dimensions is a simple perception, which happens in a sensory-motor response manner. This type of perception is called as "habitual recognition" and it can only occur when the person has previously repeatedly acquired the same images (Bergson, 2004, p.90). For example, if a cow sees some green grass and comes to a clear conclusion that the object is something it

can eat based on past experience of similar images then this is called habitual recognition. For humans, this situation resembles the experience that whenever a very familiar object is perceived, they are almost immediately recognized as such. For example, when we come across with a close friend on the street, we can easily recognize who he/she is. As a result, in the situation, which is described as the habitual recognition, the perception is no longer a mental process and the person immediately quits analyzing the target object.

In habitual recognition, the important thing is that the person matches the object with an image in his/her mind at first sight. The question of whether the image matched exactly qualifies the reality of object is irrelevant to this point. If we need to clarify the habitual recognition with the circles mentioned previously, we may visualize mental impact in habitual recognition in Fig. 3.
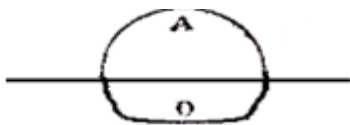

Figure 3: Interpretation of Habitual Recognition in Bergson's Perception Model

Another perception type that Bergson introduced is called as "attentive recognition". The first contact with the object in

the attentive recognition does not turn out an automatic result as in habitual recognition. This occurs when the data gathered from the object does not follow a previously repeated path of images in the memory. In this case the perception process follows an iterative path as depicted in Fig. 2. At every step the person gains a deeper insight of the object by dynamically updating his attitude towards the object. As a result, a dialectic interaction between the object and pure recollections occurs.

In attentive recognition, the person becomes mentally more participative. When compared to habitual recognition, the object stays at the focus for a longer time and the person is able to construct a richer image of the object since the brain may come up with non-ordinary associations based on the characteristics of person's pure recollections. On the other hand, survival of attentive recognition process is dependent on the success of images retrieved at every step of perception. That is to say that the images brought to the conscious part of the brain needs to build up a consistent path to the final image of the object. When the images do not properly gather around a meaningful interpretation of the object, the object may easily go out of being the perception target of the person.

Reasons to Choose Henri Bergson's Perception Theory

One of the most important issues in the problems related to immersion concept and accordingly interaction concept is that during the immersive experience, we have a difficulty in differentiating the processes that take place in person's mind and that take place between the person and the target object. The problems and the contradictions in those concepts have been mentioned in the previous chapters. Therefore, in order to put forth a new viewpoint for these concepts, we should manage to do this differentiation, which is one of the biggest obstacles to overcome. Although the process taking place between the person and environment is easy to see, due to physical interaction, we need a clearer look on the mental processes in immersion. When we look at Henri Bergson's perception approach, we see that the model presents a clear expression of what can be happening on the mental side. In Fig. 2, we can see a proposed model of mental processes. This model gives us a hint about the interplay between the data, which is gathered from the target object through senses, and person's mental interpretations. Also we can separately see the role of the unconscious memory and role of the conscious part of brain. According to this the unconscious memory becomes the element where person's individual characteristics and past experiences could be represented. On the other hand, the conscious part of the brain remains as the place where the results of perception come into present time (in Bergson's

term where "actualization" happens). Details about how Bergson's mental perception processes can be applied to the immersion process are discussed in next chapter.

Thanks to Bergson's model we have more insight into the mental processes of the person. As a result of this the interaction between the object and person's mental processes could be separately analyzed. By this way, it becomes easier to identify the impact of the dynamics in the immersion process and to analyze what parameters that separate the immersive experiences from each other.

When all of the approaches of the concept immersion are examined, in the heart of them, it is the sensation or experience of being surrounded mentally in a special process of involvement. Starting from this point, two main elements behind the immersive experience attract the attention.

One of them is that immersive experience occurs in a certain process that is based on time. This process is more obvious in the approaches that employ the metaphor of "transportation". Consequently, the time should be taken into consideration as a significant parameter in the analysis related to formation and continuation of immersive experience. When we examine Bergson's perception model in Fig. 2, we can visualize the interaction path between the person's mind and the target object in time throughout the act of perception. For that reason, Bergson's perception theory can provide with clues about the structures expected to change in the immersive process over time. These structures are basically the mental

state and the viewpoints changed in accordance with mental interaction (involvement by means of attentive recognition) with the object. Details about how the time-based structure of Bergson can facilitate our understanding of immersion are given in the next chapter.

The second basic element peculiar to immersion is mental involvement and internalization that we see especially in the approaches that use the metaphors of losing oneself. Beside the conditions and content of the environment that the person contacts in the immersive process, this situation requires the need for revealing the person's mental changes and standpoints in a traceable way. The mental activities revealed in Bergson's perception model and situational changes occurred in mind serve as signposts while examining the concept of immersion. In chapter 5, the reader can find details about how this mental state constitutes a basis for immersive experience.

CHAPTER 4

4.1. Principles of Perception

In this chapter, we will try to develop a different point of view using perception as a basis for immersion in order to avoid the problems mentioned in the previous chapter. For that purpose, firstly it would be beneficial to identify some basic principles related to the concept of perception that we will use as a basis for the immersion. As mentioned in the previous chapter we will be utilizing from Henri Bergson's perception approach.

4.1.1. Level of Mental Involvement in Perception

When we think about the mental involvement of the human that they have while perceiving objects in daily life, we can see that the level of this involvement is highly affected by the memory related to that object. In Bergson's perception model in Fig. 2, the things that the mind perceives about the object is expressed resulting terms of the images emerged after the associations and interpretations coming from memory, that is "pure recollections" in Bergson's terms. Accordingly, the content and organization of the structures that the person has

in his mind before perceiving the object is effective on what images that person will come up with when stimulated by the object.

When we consider this effect of the mental accretion on perception, we encounter with three different cases related to mental involvement of the person perceiving a target object.

One of the cases is the situation in which the person does not form any idea about the target object or any part of the object. This occurs when the stimulus coming from the object is beyond the biological sensing capabilities of the person. In this case, for the person, the object cannot be sensed or recognized. The situation in which a diver who is going fishing passes over a fish which camouflages itself as a rock; or the situation in which an object emitting infrared light, which cannot be seen by naked eye and not noticed, examples of such a case. On the other hand, we should exclude some events from this situation such as the one in which a night watchman keeping guards carefully cannot understand from which object the strange sound he has heard is coming from. In this example, for the night watchman, the sound he has heard caused many associations and already became meaningful.

The second case is the situation where the images coming from the object causes images in the mind of the perceiving subject to be attracted and attached to the object itself. In this way more and more of the details of the object is discovered and perceived as more and more images from the memory are attached to it. As the interest of the subject in the object increases

he/she starts perceiving more details of the object. The person links the stimuli coming from the object with the familiar memory-images in the mind. In such a case, the subject has a high perception potential related to the object. This case corresponds to perception that Bergson mentioned with the term "attentive recognition". Bergson expresses this situation in which the object gains a certain seat in mind and perceived a new with each new perception. For example: when a person listens to a piece of music, each time he listens, he notices new details of it, and new impressions of it are left in his mind. In this case of perception, the object creates some new relevant images in the person's mind which does not match exactly the image of the object imprinted in his memory previously. By this way, the person does not lose his interest in the object and tries to get more insight to the object. As a result of this, the person experiences a high level of mental involvement.

The third case of perception is seen in the case in which the person has a high level of familiarity with the object of perceptions. When the person comes across with the thing he is very familiar with, he does not regard it necessary to reflect on it over and over again but associates it with a ready-made image mechanically. This case corresponds to the event of habitual recognition in Bergson's theory. When the person reaches a conclusion about the object in a sensory motor way in the habitual experience, the object is no longer the target for perception and the attention of the person shifts to other objects. To give an example for this, for the taxi-drivers who

are very much accustomed to driving, the car or its parts such as the wheel and the gear box are no longer objects for perception. While they are driving, they can easily concentrate on the different things such as the customers, the routes, and the fee to be collected from the customers etc.

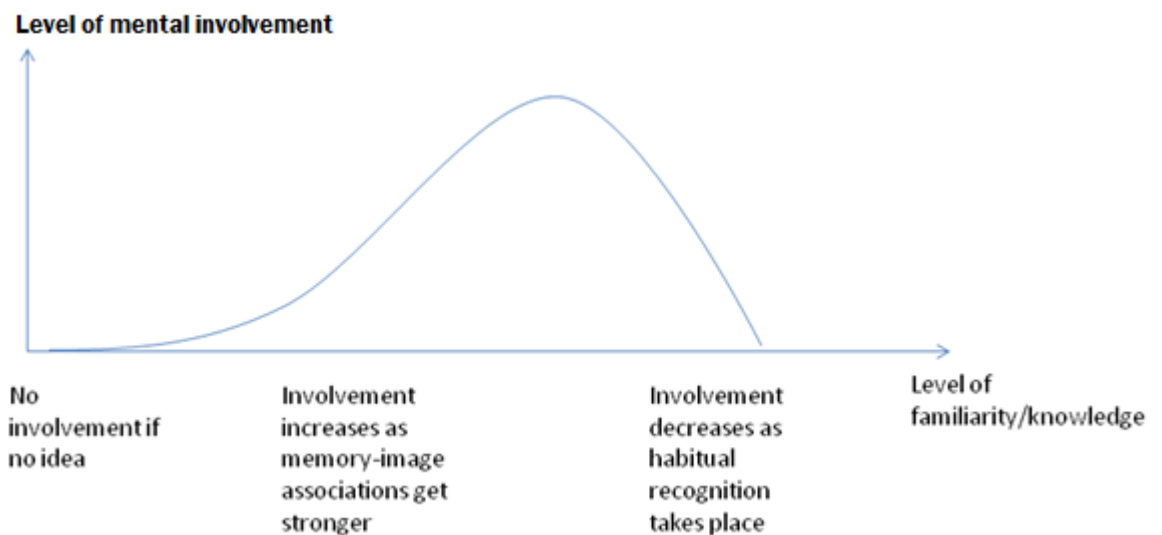We can visualize the different cases of mental involvement in perception by means of the diagram given in Fig. 4.

Level of mental involvement

| No involvement if no idea | Involvement increases as memory-image associations get stronger | Involvement decreases as habitual recognition takes place | Level of familiarity/knowledge |

Figure 4: Level of mental Involvement in different cases of perception

4.1.2. Process of Perception

It is seen in Bergson's theory that the perception is not only composed of with the stimuli coming through the senses from outside world. Instead, we need to consider the perception as

a product of interplay between the sensory data coming from outside world and the person's memory. Therefore, in the processes of perception and immersion, we need to design our play area in a way to include these parts.

The role that the person's memory plays in perception leads us to notice an important factor. According to Bergson, in each step in perception process, the person acquires a different standpoint from which he perceives the object. In each of the subsequent step in perception process, how the person will interpret the sensory data coming from the object depends on the views of the object gained in the previous steps. Bergson names this dynamic standpoint of the person as "bodily attitude". According to Bergson's model bodily attitude of the person propagates throughout the steps of perception process and affect the resulting memory-images that are brought up to conscious part of the mind. According to Bergson, the bodily attitude of the person is formed and renewed in the sequence of images or actions felt by the conscious mind after associating the sense data obtained from the object with memory-images. If we extend this idea, we can state that the person is apt to perceive the target object in certain contexts based on his current mental and physiological state – the bodily attitude. We can also say that the bodily attitude is renewed in every new step of perception as depicted in Fig. 2 of Bergson's model.

In order to comprehend Bergson's perception theory more clearly, we need to discuss the terms "virtual" and "actual"

that Bergson defines in a way peculiar to himself. First of all, it should not be overlooked that there is a huge difference between Bergson's term "virtual" and the term "virtual" which is generally used to refer to fake and fictional in popular concepts such as "virtual reality". Bergson uses the term virtual in Matter and Memory to identify pure recollections accumulated in a person's past life, which has a potential for coming in sight at any moment that is being actualized. Accordingly, virtual is the store house of past images which is something unknown, uncontrollable but something that can only have an effect on the person by reaching to the conscious mind through an association with external stimulus and through the effect of bodily attitude that picks up a past memory-image. As it is understood, Bergson's concept of virtual is not the antonym of the reality. It is the antonym of the actual. However in popular parlance and the literature on virtual reality we reviewed earlier the term is used usually as the opposite of, or alternative to reality. These different usages of the term virtual are emphasized by Maria Ryan in detail as in Table 1 (Ryan, 2001, p.28):

ACTUAL	VIRTUAL
enacted	Potential
factual	counterfactual
Accomplished	Possible
Closed	Open
Material	Mental
Concrete	Abstract
Particular	General
Determinate	Indeterminate
…….	……
Space	Cyberspace
Being	Presenting
Identity	Passing as, role playing
Serious behavior	Make believe
Lived experienced	Fantasy and dreams
Fact	Fiction
Truth	Illusion, falsity

Table 1: The meaning of virtual (subset of table) (Ryan, 2001, p.28)

The antonym of Bergson's concept of virtual is the term "actual". Bergson defines the term "actual" as the images that occur in the conscious part of the mind and as the images felt and perceived by the person at the moment. Namely, while the term virtual is considered as the uncontrollable potential images in memory (pure recollections), the term actual is regarded as the consequences of perception, which is a result of the associations in mind upon the stimulus coming from the target object. A note of warning is necessary here: the term "potential" in the above sentence "potential images in memory"

does not imply that actualization of them in the consciousness is a mechanical process as in the conversion of potential energy to kinetic energy. Bergson stresses that this is a creative and not a deterministic or automatic process.

If we need to clarify the difference between the term virtual in Bergson's theory and the virtual reality systems, we can have a comparison as in the following: A computer-supported simulation program is a typical virtual reality system. This simulation environment is a fictional or fake environment which does not exist in reality but can imitate the reality reasonably. On the other hand, according to Bergson, while a person is using this simulation program, as far as he sees and feels the things in the simulation, this fake environment becomes actualized for him/her. Consequently, the terms virtual and actual when mentioned in the context of Bergson's theory should be considered in their special meaning and they should not be confused with their usages in popular discourse.

One of the important concepts that we will be using in our study is the concept actual in Bergson. As explained above, actual should be considered as relating to the results of the person's perception. In the model shown in Fig. 5, mental associations, which emerge upon obtaining data from the object through senses, result in actualized memory-images in the conscious part of person's mind. Therefore, in the process of perception and immersion that we will be dealing with, the event of actualization can be seen as the keystone of the images visualized in person's mind in the wake of data

obtained from target object. To put it differently, it can be said that the events of actualization constitutes a path for the person to the things he actually experiences and he actually feels around.
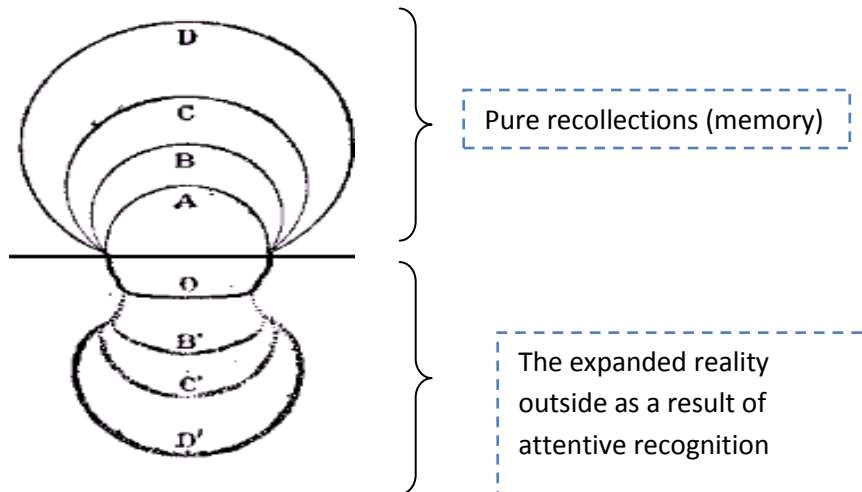

Figure 5: Perception Model of Bergson (Bergson, 2004, p.128)

4.2. Extension of Bergson's Perception Model to Handle Immersion

Even though Bergson's perception theory provides a useful way to explain immersion concept from several aspects as discussed in the previous chapter, there is still a puzzle to be solved. The first element causing this puzzle is that in immersive experiences, the target object is usually more complex than considered in Bergson's theory. For example when we consider the media types that are involved in the discussion of immersion concept, we observe that the content presented to the user usually outputs a time-varying sensory data to be

perceived. It is easy to see this fact in cinema, in books or in computer games in which a certain type of content is changing by time on its own. This dynamic characteristic of target objects in immersive cases requires us to handle an additional process which is caused by the object and which happens parallel to the mental processes of the person. Secondly, as opposed to Bergson's model, we sometimes need to consider the target object as a medium or environment as whole rather than single points of interest. This is because in most cases of immersion such as computer simulations or narratives etc, the aim of the immersive object is to build up a complete picture of some fictional environment. Thus, in this case although the constructed environment involves discrete objects to be perceived by the person during the process, the focus of perception should be kept on the total impression obtained from the environment as a whole.

It has already been stated that immersion concept is a subject for many media types such as narrative, theater, cinema, music and virtual reality systems etc. Moreover, we should also consider that the immersive state can be seen in different contexts that people involve in daily life. When we have a look at both media works which concern immersion and our experiences in daily life, it is recognized that the content presented to the person for consuming is in fact complicated and the content can contain dynamic events that involve more than one object, relationship between the objects, and/or a temporal story line etc. Thus, in order to apply Bergson's perception theory in the context of immersion, we need to

improve Bergson's person-static object perception model into time-based dynamic object perception model in which both the bodily attitude and the object perceived changes physically as time passes.

If we give a thought to Bergson's model in Fig. 6, in order to reflect the immersive experience completely, we need to build up a structure in which both the state of the person, bodily attitude as Bergson stated, and the data presented by the object changes in time, rather than the original model by Bergson where the time runs only in the vertical axis, i.e., only the person's attitude changes over time as the circles expands on both directions of the vertical axis in Fig. 6. In fact, the person's changing bodily attitude in Bergson's theory transforms the object virtually in a dynamic process as explained above, which also changes the person's perception of the object. When viewed from this aspect, it can be seen that we have not moved far away from the basis of Bergson's theory. However, the change of the target object is not only shaped by the viewpoint of the person but also shaped dynamically by the internal mechanism that constitutes the narrative structure of the media work itself. In this regard, explaining the dynamics in the immersion process only in terms of the person's mental dynamics will cause an insufficient approach for the computer-based dynamic media types. The natural dynamic structure of environments that we involve in daily life presents a similar to computer-based dynamic (interactive) media.

When we consider the target object in terms of its expanse and
its time-dependent dynamisms and its characteristics of
involving more than one target of perception, in order to
adapt Bergson's perception model, we encounter with two
different options. The first one is to consider the dynamic
time-based media as composed of sequence of individual objects
of perception ordered in time. To illustrate this idea, for a
movie, every scene can be considered as separate objects.
Ultimately, these targets dissociated from each other
(illustrated as the intertwined circle sets in the horizontal
axis in Fig. 6) can be perceived as a whole by
juxtapositioning them in time. We can see the visualized form
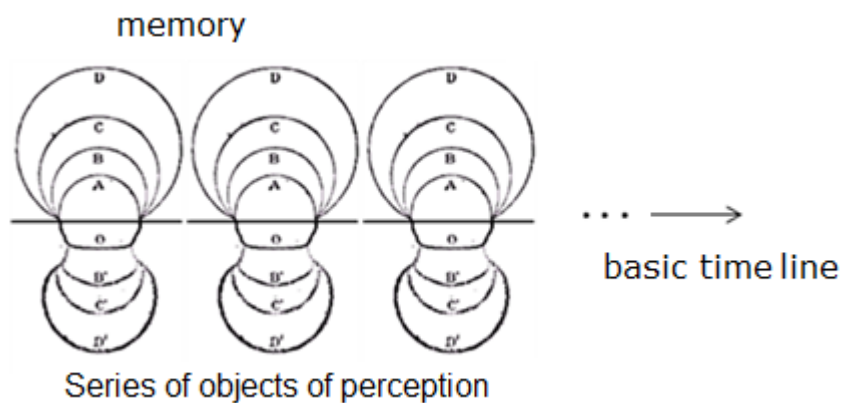of such a structure in the Fig. 6.

Figure 6: Possible extension of Bergson's perception model for
immersive experience

Although the design in Fig. 6 is quite simple, it accompanies
important drawbacks. The first deficiency in this mode is that

it makes the dynamic relationship between the target objects that constitutes the series difficult to trace. Therefore it is hard to say that this model will be instructive in designing and scripting immersive objects. Moreover, with this kind of model it seems impossible to identify the changing mental state of the person throughout his interaction with immersive object and the connections that the person establishes with the constructed environment as a whole.

Another option is to assess all the content of the immersive object as a single whole object of perception without dissociating it into individual isolated objects. In this case, the aggregated circle sets can be spread throughout out the horizontal time axis. This design can be visualized in Fig. 7.
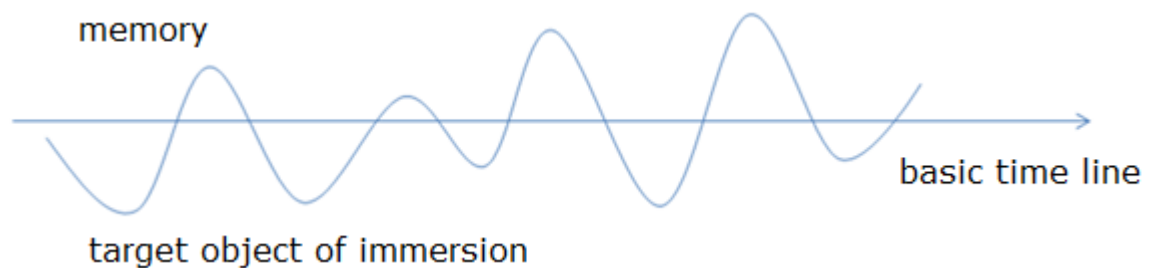

Figure 7: Preferred extension of Bergson's perception model for immersive experience

With the model illustrated in Fig. 7, a more traceable account of both the dynamic immersive object and the person's mental state becomes possible. Necessary additions will be made later

in order to express the immersive process more clearly in this model. However, even with the current model, we can say that more information can be discovered about the characteristics of the immersive object as perceived by the person and the person's internal mental experiences. The reason for this, that in parallel to the changing sensory data coming from the immersive object due to its own internal dynamics (the part under the horizontal axis in Fig. 7), we have now the chance to continuously exhibit the probable changes in the person's mental state as a function of the event of actualization along time.

4.2.1. Details of the Extended Model

In order to explain the immersive experience, we need to dwell in detail upon the model adopted in the previous section. At this part of the study, we will be focusing on the ways of how to formulize the adapted model in a traceable and concrete manner.

As mentioned in the previous chapters, while explaining the immersive process, it will be necessary to consider Bergson's "actualization" concept as the keystone of the process. For this reason, parametrically we need to first identify the event of actualization which will constitute the atomic structure of the model. The detailed version of the model given in Fig. 7 is illustrated by Fig.8 in which different parameters are used to extend the model.
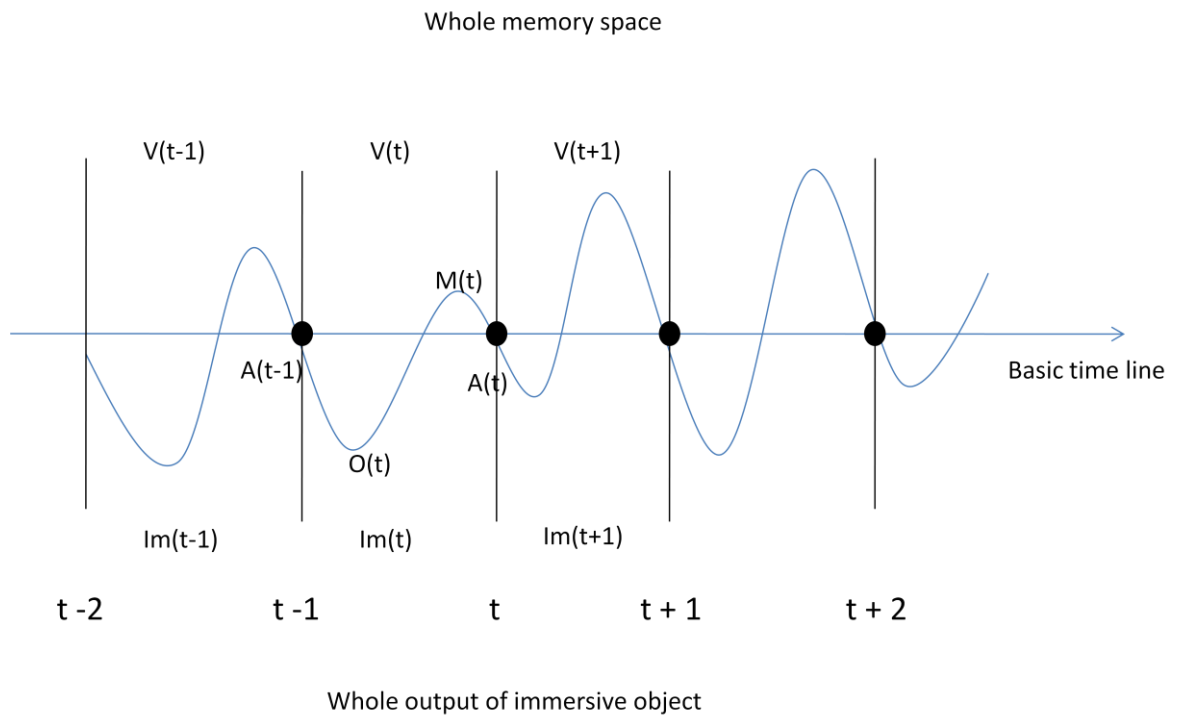
Figure 8: Parameterized version of the preferred immersion
model

The basis of the model in the Fig. 8 is the transformation of
the process identified with each full circle in Bergson's
model into time steps along the horizontal axis. According to
this, the composite event of gathering data from the object
and forming a new image of the possessing a conviction about
the object as a result of mental associations can be
considered as the basic unit event of the immersive process.
Details about how this unit event could lead to an immersive
experience will be discussed in the next chapter.

The parameters playing distinct roles in the immersion process
illustrated in the Fig. 8 can be listed as follows:

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Im(t): In time interval t, all of the output of the immersive object is revealed by the immersive object independent from the things that the person will perceive. This information represents the entire stimuli presented to the person's perception field, independently of the person's individual perception experience.

O(t) : O(t) is the personalized subset of the Im(t) perceived by the subject (user) at any point in time. In other words these are the objects that focus of attention of the perceiving subject. Since we are considering dynamic media (interactive digital systems) in general, O(t) as Im(t) dynamically changes, i.e., new images are dynamically generated and updated by the internal mechanisms of the media work.

V(t) : It represents the expansion of memory caused by the associations formed as a result of the images the person collects from the immersive object in any point of time. In other words, V(t) consists of, virtual field of memories (pure recollections) relevant to the perceived object.

M(t) : Represents "memory-images", which are a subset of V(t) selected/attracted by O(t) and conditioned by the bodily attitude of the person, P(t) (see further below).

A(t) : Is the actualized image at point t. It is the fusion of the perceived images of the object, O(t), and M(t). It represents the new image of the object constructed as a result of the interplay between the person's mind and the sensory

data gathered from the immersive object. As Bergson stated, A(t) corresponds to the images actualized in the person's conscious mind.

P(t) : Is the bodily attitude or physical state of the perceiving subject. What are meant by physical state are the physical and mental (cognitive) conditions of the person. The physical state of the person becomes effective in terms of both which sensory data related to the target object can be grasped by the person's senses and how the associations in the person's unconscious mind will be shaped. The physical state of the subject changes throughout the interaction depending on the person's physical and cognitive responses. It should also be considered as a parameter that can be imposed on the person by environmental constraints such as devices used for interaction (e.g. a data glove or haptic input device).

When we have a closer look at these parameters, we can recognize a very close relationship between them which also affects each other's result. These relationships can be easily interpreted as in the followings:

When we consider O(t) situated among parameters, we can notice that it is affected by the other three parameters. These are Im(t), P(t) and A(t-1). Im(t) is important since it constitutes the whole information presented to the person's field of observation related to the immersive environment. On the other hand, P(t) forms the framework of the observation ability of the person physically and biologically. For instance, in the simplest term, a person with his eyes closed

will not be able to observe the visual information presented by the immersive environment.

$A(t-1)$ gains importance as it represent the person's perceptions of the object in the previous time unit. This perception reached in the previous step plays a significant role in determining the bodily attitude of the person, $P(t)$, which partially conditions what can be perceived at the next point in time $A(t)$.

When we consider the factors affecting the parameter $M(t)$, we come up with the complete memory space (pure recollections) of the person, $V(t)$, and the parameters $O(t)$ and $P(t)$. Among these parameters, as stated in Bergson's theory, pure recollections of the person is not suitable to be formulized in a universal model since it is an unknown and uncontrollable element. Therefore, this factor will be considered as an unpredictable external influence in the immersive process.

On the other hand, $O(t)$ parameter is an effective factor since it represents the sensory data or stimuli that the person receives from the immersive object at time t. The reason for this is that the data represented with $O(t)$ constitutes one of the seeds for the associations that the person will have in his mind during the same time period. $P(t)$ however affects how the person will interpret the sensory input received in the mind. $P(t)$, as discussed earlier is a result of the psychological impacts of the received stimuli based on the biological and physiological conditions on which the brain depends.

When we consider the P(t) parameter, we encounter three different impacts. One of them is the conditions that are peculiar to person's body. These conditions can appear as a handicap in person's body or some extra-ability. However, since this factor is peculiar to person, it is not suitable to be formulized in a universal model. The other factor affecting P(t) is A(t-1). A(t-1), which is the image of the object the person has constructed in the previous step. It represents the person's cognitive response to the object of perception which affects the response occurring in his body.

Lastly, P(t) can be said to be affected from the special physical situations that the environment will impose on the person. A clearest example for this situation is the specially-designed interactive virtual reality systems. The use of these systems by the person may require the person to set his body in a way to use special equipments. In this case, the person may change his physical posture when starting interaction or during the interaction. When considered from this point of view, it is seen that immersive environments, that require physical adaptation, affects the person's perception in terms of two ways. One of them is the content presented to the person. The other is that the interface devices used as a part of the media work.

A(t) parameter is the focal point in terms of immersion and perception since it represents what is visualized in the person's conscious mind and what the person feels at the end of each of the unit steps of the process. A(t) parameter is

the direct result of M(t); namely, the images attracted from the realm of pure recollections and added to the object of perception in the mind of the user (subject of perception). However, when we analyze the results actualized in the person's conscious mind during t time interval in the ongoing process, we notice that A(t) appears to be depending also on the O(t), P(t) and A(t-1) factors. The fact that A(t) parameter is based on the previous A(t-1) parameter shows that the dynamic cognitive state of the person throughout the interaction is transferred from one time interval to the other.

This propagated state affects the result of actualization event in every time interval; it is also updated with the things experienced in that time interval. This dynamic state emerging in the person can be considered as the extended through time version of the bodily attitude mentioned in Bergson's theory. As a result, when considered in terms of the relationships between the parameters in the interaction with the immersive environment, this dynamic state affecting the person throughout the process comes to the scene as an important player as the other parameters discussed above.

CHAPTER 5

5.1. Identification of Immersion in the Model

In the previous part, based on Bergson's theory, we have focused on how the person's relationship with the dynamic immersive object is shaped. In this part, we will try to identify the immersive experience, which is the main issue of this study.

When we look at Henri Bergson's perception theory, the case of attentive recognition comes to mind as the closest term to immersive experience. The reason for that results from the fact that the most intrinsic and intense relationship between the person and the object occurs in this state. The closeness between the person and the object in the event of attentive recognition keeps on increasing and the meanings that the person attributes to the object take place in with a wide mental involvement. When considered from this point of view, the feeling of being surrounded and integrated with the environment lying at the core of the immersive experience overlaps with the event of attentive recognition on a large scale.
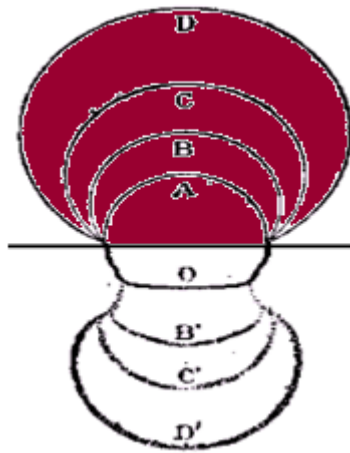
Figure 9: Mental involvement in attentive recognition

If we go examine Bergson's model in Fig. 9, for attentive
recognition, the broadness of the area that the circles above
the horizontal axis indicates the amount of mental involvement
on the part of the user. If we apply the similar idea to the
immersion model discussed in the previous chapter, the amount
of immersion will be the total areas that the curves above the
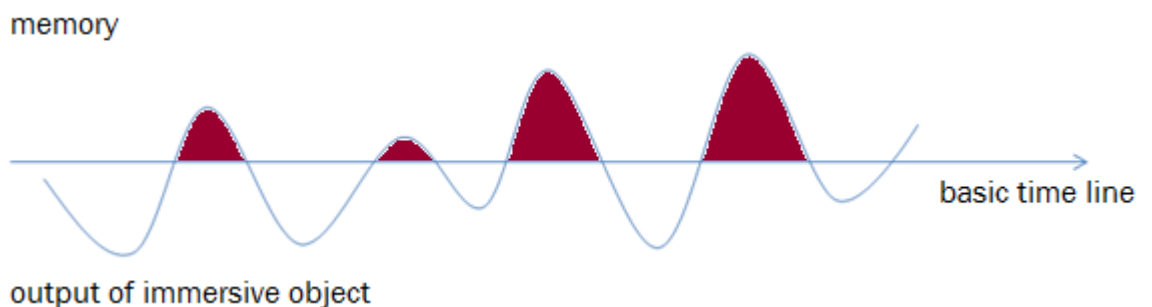horizontal axis envelopes as illustrated in Fig. 10.

Figure 10: Mental involvement in immersion model

Even though it is encouraging to liken immersive experience to attentive recognition, we need to recognize that some of the circumstances that Bergson describes in the attentive recognition process do not match with every immersive experience. According to Bergson's theory, in attentive recognition, the person plays a participatory and creative role in relation to the object, which includes an extensive part of the mind. Hence, in attentive recognition, the person should perceive the target object beyond its instantly noticeable characteristics by establishing extensive contacts with pure recollections. This situation forms acceptable and sufficient conditions for many immersive experience but not all of them.

The most important situation differentiating the immersion from the attentive recognition is the media works that provide the person with an absorbing experience although it is easy to understand and recognize its content. For example, some computer games require the person to give instant reflexive response to the presented content instead of entering a long interplay between the object and the virtual images from the memory. In the simplest term, if we consider a person playing a simple shoot them up, say a duck hunting game, this situation can easily be seen. The only thing that the player does throughout the interaction is to notice the duck appearing on the screen and aim at and shoot. A person who is absorbed in this game does not delve deep inside the realm of

pure recollection throughout the game. He will excitedly wait for the next duck to appear and whenever he misses the target duck, he will be upset, whenever he shoots the duck, it will be a source of success and satisfaction. It can be easily stated that this person has an immersive experience. On the other hand, it is seen that the perception type that the person actualizes is different from that of Bergson's attentive recognition. Therefore, we need to find a different explanation for this type of immersive experience than attentive recognition.

The other indicator of immersion in the model is the area which the curves under the horizontal axis encompass. This area indicates the total sensory data that the person was able to gather from the immersive object throughout the interaction. Consequently, we can comment that the immersive objects which enable the person to reach the maximum data or stimulus are more effective. This situation is shown in the Fig. 11.
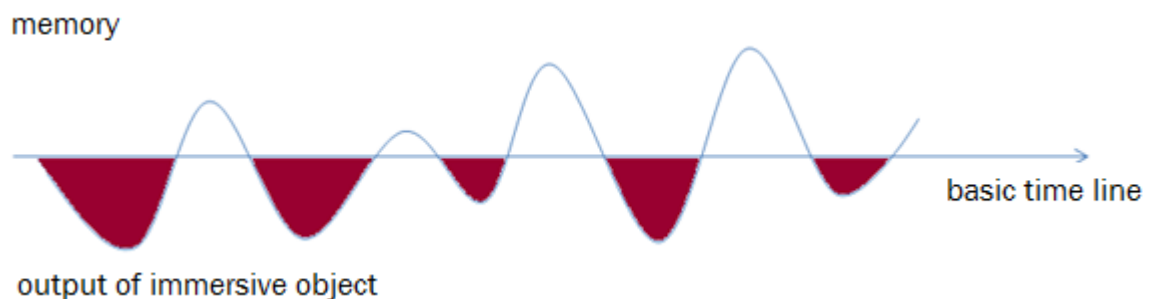
Figure 11: Data collected by the person

Even though to name an immersive object as effective by looking at the amount of data it was able to send to the person is reasonable at first glance, this condition may not be valid for some other situations. To illustrate this, strategic games, movies which are not based on many visual effects can be given. Even if many visual materials are not presented as external data to the person in these media types, the person still can have immersive experience within the scope of the media's theme. Thus, we need also to explain the immersive environments, which can manage to encircle the mind deeply with minimum output of sensory data.

When looked at the essence of the notion of the immersion, it is known that the person gets the feeling of being surrounded by the environment. When viewed from this aspect, it can be realized that the immersion is actually a mental state playing a dominant role on the person's perceptions rather than just being an instant act of perception. The element making this state special is that the person's perceptions particularly focus on an object (or a number of related objects) intensely. Thus, the things visualized in the person's mind during the process are linked to the context presented by the immersive object. In this way, the person will evaluate the sensory data in the context of past experiences (memories) and the connection between the person and the immersive object will be deepened over a period of time (duration).

When we examine the model by considering the immersion as an ongoing state controlling the person's perceptions, we see

that the person's dynamic state transferred from one time interval to another. As mentioned in the previous chapter, this dynamic state is an element which emerges as a result of the previous time intervals and plays role on the person's perception in the subsequent time intervals. In addition, we should not forget that this dynamic state is updated by undergoing a change as a consequence of the event of actualization in every time interval.

In the light of all these information, we can deduce that the immersion situation is a special state of the dynamic personal state identified in the model. The person in immersive state focuses on the theme (or goal) created by the object and the person gives priority to perception in the scope of this theme or goal. For example, an immersed person playing a war-themed computer game will first interpret the characters on the screen as friends or enemies. Likewise, the audiences of a movie which is about a family drama will evaluate the progress in the movie in terms of how they can change that family's fate.

As a result of the above conclusions, the dynamic state of the user in immersion needs to be analyzed more clearly in the perception process. The most important feature of this dynamic state on the part of the user is the impact of it on the person's perceptions. Hence, in the immersion model shown in the Fig. 8, we need to discover a term, which is transferred to the following time interval after every event of actualization and which affects the person's perception

results. This term in this study will be expressed as "expected perception space". Accordingly, "expected perception space" indicates how the person will interpret the information coming at a given point in time based on the person's standpoint gained as a result of the actualizations in the previous points in time. In other words, with the attitude that the person has acquired in previous steps, the person becomes more able to perceive some data and less able to perceive some other data in the following step. When considered in terms of the immersion concept, the aim is the concentration of the perception potential of the user in his "expected perception space" which is transferred from one moment to another during the engagement (interaction) with the immersive object. The visual drawing regarding to "Expected perception space" is shown in Fig. 12.
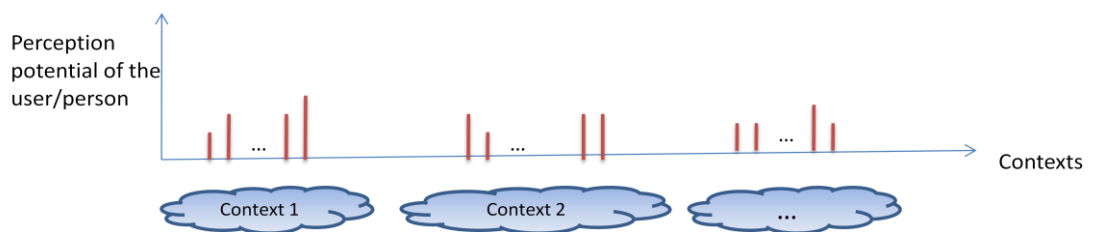

Figure 12: Expected perception space

In Fig. 12, the horizontal axis represents the whole sensory data which are presented to the person. These elements should be considered as the immeasurable space content of which is difficult to describe and which changes from person to person.

Here all meanings that the person can actualize by interpreting in his mind as a result of data gathering from the outside world are spread to several different distinct (and usually unrelated) contexts. The clouds under the horizontal axis have been used to cluster sensory data presented to the person under certain contexts. The vertical axis however indicates to what extent the person perceives/actualizes the information (conveyed by means of sensory data) that is available to him. Although the perception space of the person and the perception potential have much more complicated relationship, such a plain and simple visualization will facilitate our works regarding to our point.

We need to interpret the person's perception potential indicated in the Fig. 12 as a renewed source in every actualization point of the process identified in Fig. 8. By this way, we can have the opportunity to completely reflect the dynamic personal state which is transferred between the time intervals.
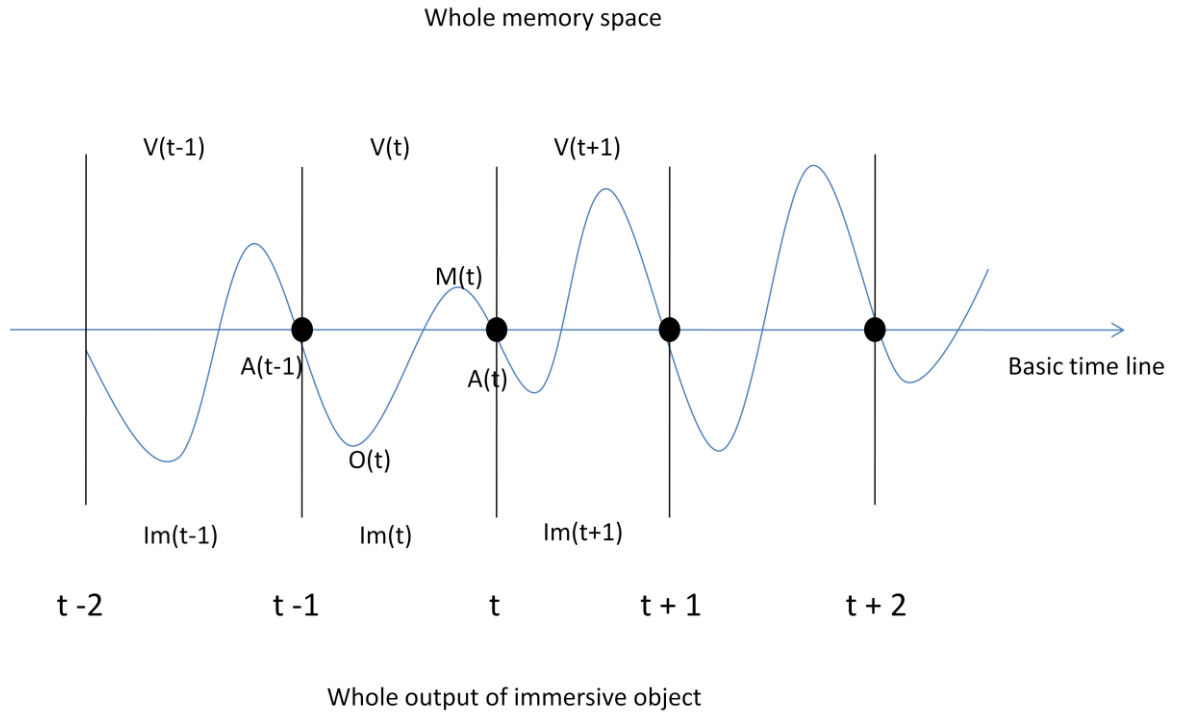
Figure 8: basic immersion process model (reprinted for convenience)

It has been previously stated that the immersive situation is a special state of an on-going mental state which is maintained throughout process. As we objectify this dynamic state with the term "expected perception space" as in the Fig. 12, we also need to note that the immersion is a special case of this state. What makes immersion a special case is that the presented sensory data is mostly actualized on the immersive object's context along the horizontal axis by the person. When the actualized images concentrate on the context created by the immersive object, as illustrated in Fig. 13, we can say that the object or the media work achieves the effect of immersion.
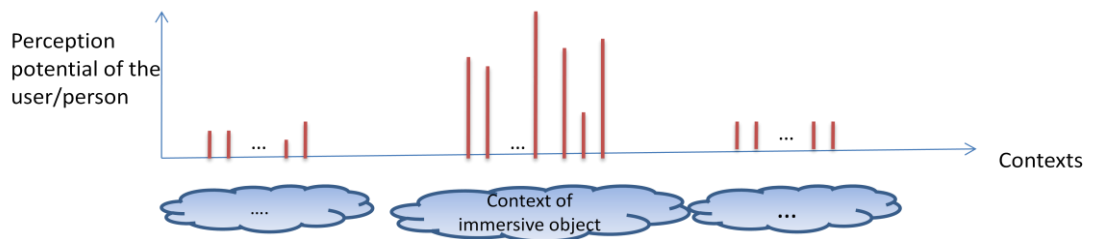
Figure 13: Identification of immersion with "expected perception space" concept

The state indicated in the Fig. 13 is that the person concentrates his mental powers on the context presented with the immersive object after a certain point of the process in time. Therefore, the elements that the person expects to perceive in the next step are mostly determined by the context or theme of the immersive object. Consequently, the images which are closely related to the theme/context of the immersive object will have higher perception potential and the person will stay in that context during the process.

5.2. Resolving the Issues of Immersion

In the second chapter, even though we can have intuitive inferences regarding the available immersion approaches, it has been stated that when we go into detail, we face some problems. In this study, the immersion is described with a model based on a distinct perception theory focusing on the

process unlike the existing approaches. Therefore, we need to answer the questions stated in the second chapter with this model.

In the new model put forth for immersion, contribution of memory, the things occurring in the conscious mind of the person and the output data gained from the immersive object can be evaluated separately. Thanks to this, the penetration of the immersive object into the person's mind as an external data and as a result of this the changes emerging in the view points of the person can be described procedurally. This cognitive approach makes it possible to discuss the occurred events with their natural aspects without neglecting the meaning at the core of the immersive experience. Thus, it prevents us from having a vague idea about the immersion process as it is the case in the approaches in which the metaphors of transportation and projection are used.

When we think of the issues emerging from the approach based on the idea of losing oneself related to immersion, we basically encounter two problems. These are stating how to evaluate the personal characteristics of the person throughout the immersive process and with what parameters the state of losing oneself is described. It can be stated that in this new model, the accretions accompanying the person can be expressed in two aspects. One of them is the memory of virtual images mentioned by Bergson and the dynamic mental standpoint transferred from one time interval to the other during the process. These two elements establish the basis of the

meanings actualized in the person's mind when the person observes as external image. On the other hand, it can also be seen in the new model that which important parameters affects the development of the special perception state that the immersion situation requires. Detailed analysis of those parameters was made in the previous chapter.

Another problematic issue in the available immersion approaches was that immersiveness has been used as success criterion for many media types. The reason of this problem is that it cannot be measured to what extent the media content affects the immersive situation to occur. Although the media content is weak in terms of immersiveness, that is loosely structured, the user could still be immersed in the media because of the associations brought up by the mental act of the user. In other words, immersion in such a case enabled more by the user's cognitive processes than the content offered by the media work. Therefore we need to know the roles played by the memory of the person and the media content on the world created in the person's conscious mind separately. We can easily understand that the basis to manage this has been established in this new model since we have identified these different factors with different parameters in the previous chapter. So it is now possible to separate the effects of these different factors and do the analysis independently for the two major factors.

5.3. Maintenance of Immersion

In the previous chapters, the immersion concept was explained with a model based on workable parameters. At this part of the thesis, based on our model, we will try to develop ideas related to the enabling and maintenance of immersive situation.

When we discuss immersion in a very broad sense, we see examples with different characteristics. While trying to identify immersion on the model, we have mentioned that there are important differences between the reflexive computer games such as duck hunting and creative games and media that involve imagination, such as "art films" or games based on strategic thinking, such as chess. Although there is a common immersive sense in all of these situations, there are different types of processes between the person and the immersive object. The elements creating the difference here will bring light to the ideas on how the immersive situation can be managed in terms of particular medium.

When we have a look at the general pattern of a game similar to duck-hunting, we can notice that the curves above the horizontal axis in the Fig. 14 encompass less area. This is because; those instantly noticeable immersive objects expect the person to give almost instantaneous reflexive (automatic, mechanical) responses. Therefore the person does not develop

deep associations in his mind to make sense of the data coming from the immersive object. In this case, the broadness of the area under the horizontal axis will change according to rich content that the object presents and in proportion to the external information (sensory data) that the person needs.
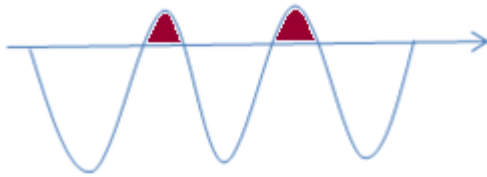

Figure 14: Sample perception pattern for simple games

On the other hand, when we look at the general perception pattern of a strategic-game, we can come up with a model as in Fig. 15. As it is seen in the Fig. 15, such immersive environments need more mental processing. This is because; the person needs to make sense of the information obtained with more expansion in memory and more associations. Here, the area under the horizontal axis can change in accordance with the amount of sensory content of the immersive object and the amount of external data that the person will need during the process.
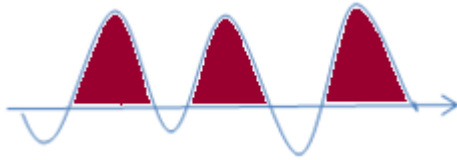
Figure 15: Sample pattern for strategic-game like immersive objects

The main difference between these two extreme situations is the proportion of the mental work expected from the person. When considered in terms of designing the immersive media, this proportion of mental work can be evaluated as an important trade-off issue. The reason for that results from the fact that both perception patterns come with some advantages and disadvantages in terms of maintaining immersive experience.

In order to understand the trade-off issue, let's discuss the simple duck shooting game as a representative of the first type of immersive objects; and for the second type, let's have the chess. As mentioned previously, the main difference that between these two examples is the broadness of the area above the horizontal axis according to Bergson's perception model. As can be predicted, for the person playing chess, this area is bigger than the other example. The clear reason of this is that chess requires much more background information. Another reason is that the result of the game cannot be foreseen due to the many combinations that the chess includes. Thus, when the person looks at the situation of the stones, he needs to have a relatively richer mental analysis, which inclines

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expansion of the memory space, and the formation of memory-images, in order to take part in the game effectively.

When we think of the advantages of the chess in the light of the information above, we can see that it can establish a more durable relation with the person and it is open to innovations between the person and the game since it can create broad expansion in memory. Therefore, the game gains dynamisms for presenting rich variety for the person by avoiding the monotonous structure of repeating itself.

On the other hand, if we have a look at the disadvantage of the immersive objects such as chess, the person is expected to have significant background information previously learned related to the game. The person playing chess will need his memory of similar chess positions and scenes to provide continuous feedback in order to maintain the process effectively. On the other side, for the person who has not sufficient knowledge about the game, what the scene on the game board will bring out of his mind becomes more indeterminate. In this case, the person who is connected to the game in a weak way, and can easily be broken away from the immersive state. The most extreme example for this is that for the person who has no information about chess, the stones on the board may even mean nothing but an untidy table.

The trade off situation exemplified by in the discussion of chess above is illustrated by the graph given in Fig. 4.

Level of mental involvement

No involvement if no idea

Involvement increases as memory-image associations get stronger

Involvement decreases as habitual recognition takes place
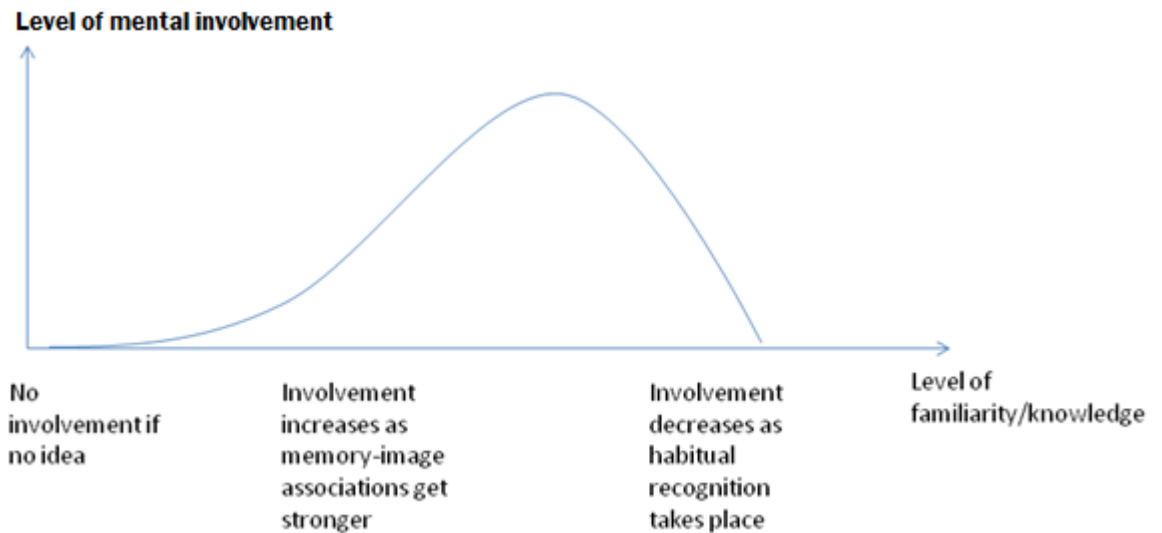
Level of familiarity/knowledge

Figure 4: Level of mental Involvement in different cases of perception (reprinted for convenience)

According to Fig. 4, the precious experience needed for establishing an immersive state in a game such as the chess game will be located somewhere around the middle and middle-left of the graph. As it is seen at this part, the data coming from the game contains the potential for the person to have an effective mental participation. On the other hand, if we think of the simple duck hunting game, unlike the chess, the presented content can be perceived almost automatically or habitual. A joystick similar to a gun and the ducks on the screen that are trying to escape will easily provide the necessary context for the game. Here we should state that we assume that the associations related to the fact that the gun can be used to shoot and the ducks can be hunted are more common compared to the rules of chess.

In fact, this agreement is valid for most of us with very few exceptions. The clues that the duck hunting game provides regarding its content at first glance causes for the person's "expected perception space" to become narrow quickly about the game context. After this point in terms of the game, it becomes easier to direct what the player expects to see and depending on this what he will be surprised at and what he will get satisfied with. Therefore, it can be thought that the immersive objects that are based on the sensory data which can instantly be recognized can easily engage the person. However, the risk that these types of immersive objects have should not be overlooked. When the situation is evaluated through the graph in the Fig. 4, it will be noticed that the data obtained from such objects are represented mostly at the right side of the graph. Accordingly, even though the data in this area is easily recognized by the person, they carry the risk of transforming into the monotonous repetitions perceived through habitual recognition. As stated before, when the process is transformed into an automatic response, or a reflex, the person's mind will find opportunities to delve into other thoughts related to other contexts.

The general valid theory for the immersive experience is the constriction of the expected perception space that is described in the model. The concept of excepted perception space here should not be considered as the lack of the mental involvement or reducing the person's creativity. When the person focuses on the immersive object's context, the powers

of association and actualization of memory-images become more intense.

In conclusion, the design of immersive objects and media works based on them should take into consideration the trade-offs mentioned above in order to direct and maintain the immersive state of the user. In accordance with this, the presented content should be familiar to the person in a level not to totally frustrate and alienate him from the context but uncertain and rich enough not to create a repeated habitual recognition process.

CHAPTER 6

6.1. Conclusion

This study basically offers a new cognitive model of the phenomenon of immersion which is based on perception processes. Throughout the study, immersion concept is considered in the widest scope without limiting it to a specific context of one type of media. Thereby, the process of immersion is handled universally, which is applicable any process between human and an external object that involve perception.

The most important contribution of the model offered is that it takes the effect of memory and person's individual past experiences and knowledge into account. In the model presented the experience of immersion is identified as an implicit mental state. Another important factor in immersion, in addition to the role played by memory, is context of the interaction. Accordingly, the concept of "expected perception space" is introduced in Chapter 5. This concept is important as it clearly reveals the implicit mental state, and purposes, expectations and goals of the user in the immersive experience.

The main motivation behind this study is that current approaches to immersion do not provide an analytical framework, which helps to understand, model and measure the level and success of immersive experiences. When the large scope of immersion is considered, lack of such a framework constitutes a significant deficiency in the field. From this point of view, the model offered becomes important since it can provide a useful framework, which allows analysis of immersion process in terms of various parameters. Since the model is based on Henri Bergson's perception theory, it facilitates the analysis of immersive experience as a time based process. Moreover, by utilizing from Henri Bergson's perception theory, the new model enables us to construct an understanding which is consistent with basic processes between human and his external world.

It is clear that the model presented has some missing parts and it should be further improved to make it practical framework in designing immersive systems and assessing the success of the existing immersive media. However, notwithstanding its limitations, it is now easier to understand immersion concept in a more concrete and analytical way rather than using metaphorical language and romantic imaginary.

Having a formulized description of immersion concept is also important to some other fields, which are closely related to immersion, such as games design. In Chapter 5, in the context of the discussion of the relevant conditions for maintaining a

person's immersive experience, how the ideas offered by the new model of immersion could be useful in media design is touched upon. The present model and its possible future extension could be helpful in both immersive media design and in analysis of human media interaction. Moreover, since the model provides an analytical framework for understanding the human-media relationship, it could be useful in developing models and concepts relevant to other aspects of digital media and interactive computer system fields.

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