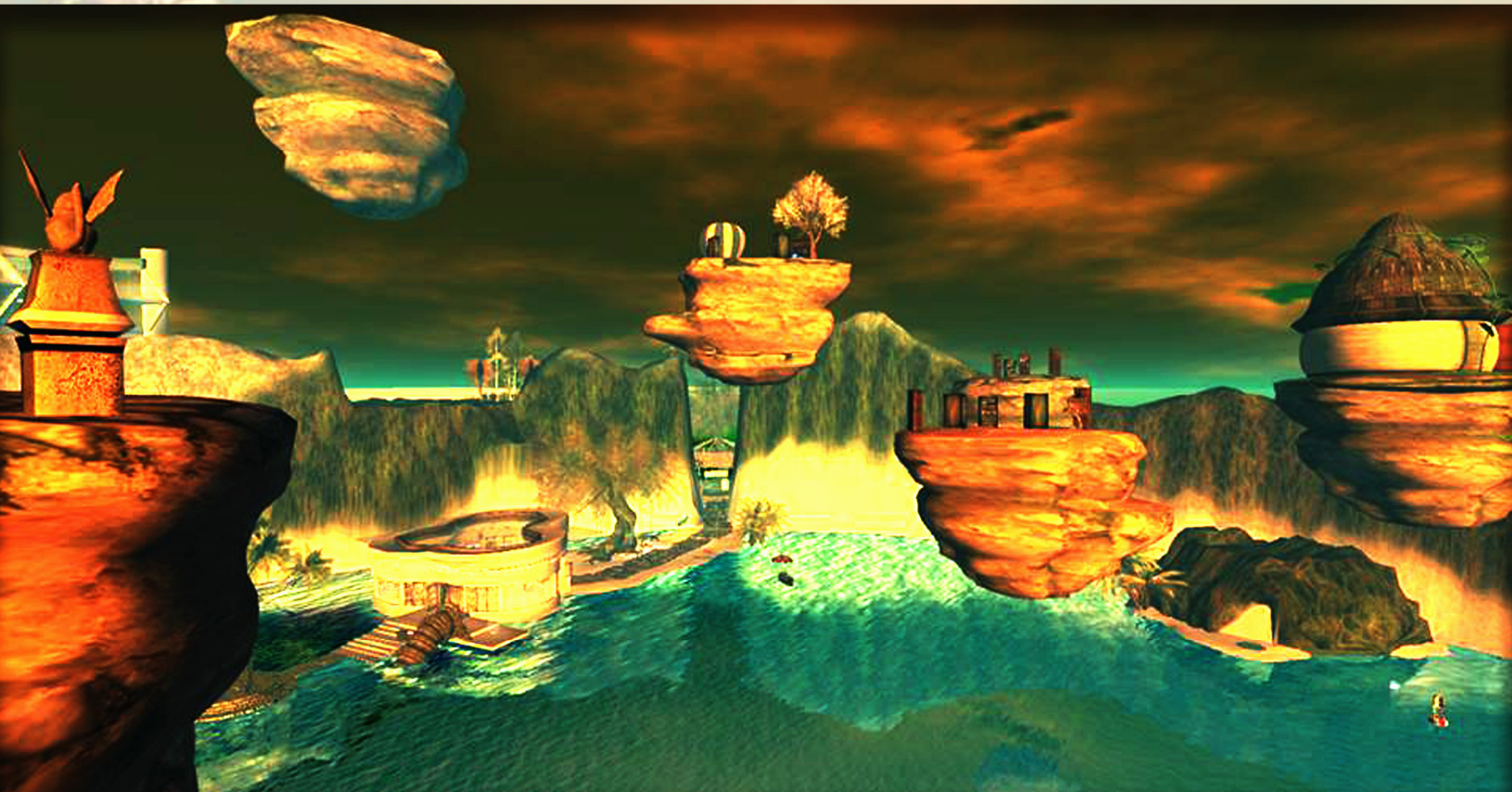


Journal of • Virtual Worlds Research

jvwresearch.org ISSN: 1941-8477

Assembled 2015

February 2015
Volume 8 No. 1



From: Alexandria - A Virtual Repository of Knowledge



Volume 8, Number 1

Assembled 2015

February 2015

Editor in Chief

Yesha Sivan,
Tel Aviv-Yaffo Academic College, Israel

Issue Editors

Stephanie Blackmon,
University of Oklahoma,
Norman, OK, USA

Patricia Anderson,
East Carolina University
Greenville, NC, USA,

Coordinating Editor

Tzafnat Shpak



The JVWR is an academic journal. As such, it is dedicated to the open exchange of information. For this reason, JVWR is freely available to individuals and institutions. Copies of this journal or articles in this journal may be distributed for research or educational purposes only free of charge and without permission. However, the JVWR does not grant permission for use of any content in advertisements or advertising supplements or in any manner that would imply an endorsement of any product or service. All uses beyond research or educational purposes require the written permission of the JVWR. Authors who publish in the Journal of Virtual Worlds Research will release their articles under the Creative Commons Attribution No Derivative Works 3.0 United States (cc-by-nd) license. The Journal of Virtual Worlds Research is funded by its sponsors and contributions from readers.



Volume 8, Number 1

Assembled 2015

February, 2015

A Theoretical Model, including User-Experience, Aesthetics and Psychology, in the Design Process of 3D Avatars

Thomas Photiadis

Cyprus University of Technology

Nicos Souleles

Cyprus University of Technology

Abstract

This paper introduces a theoretical model that combines three theoretical factors which – it is argued - significantly contribute to the operation of designing 3D avatars. These factors are aesthetics, user-experience and psychology. The aim of the report is to put forward new ideas on what informs the design operation of 3D avatars. An additional reason for the creation of this theoretical model is to simplify the procedure of 3D avatars design, while at the same time comprehending the influence of aesthetics, user-experience and psychology. The paper provides an overview of existing research on aesthetics, user experience and psychology and how these can inform 3D avatars design procedure. As with all theoretical models, this one too needs further testing; a set of future research questions are posed.

1. Introduction

There is limited research on designing procedure for three-dimensional (3D) representations also known as avatars, and what influences are brought to the design process. In this paper, three interrelated, subjective factors are analysed to provide a theoretical model informing the design process. These factors are user experience, aesthetics and psychology.

In each area of interest there is relevant and sufficient research. Many connections and influences between them have not yet been explored. Accordingly, exploring these fields can lead to a theoretical model contributing to the related literature. The aim of this paper is to explore these three factors and highlight their relationship so as to produce a theoretical model of their elements that bear on the design of avatars.

In the last two decades, 3D environments have presented much interest, at least partly caused by wide interest and acceptability of the freedom that individuals feel from the moment of the first interaction in virtual world. The interaction without rules feeling (freedom) with the presentation of a beneficial profile are the primary reasons that 3D worlds gain recognition and become more attractive (Castronova, 2003).

The first moment feeling of freedom is derived from the user's representation, called "3D character" or "avatar," containing various illustrations of the user to present themselves through 3D worlds, while navigating and interacting within them. As Ducheneaut, Wen, Yee & Wadley (2009) pinpoint, users bear the possibility, through their avatars, to socialize, communicate, collaborate, learn, and work with other participants in the 3D universe. In addition, it is important to consider that in some 3D environments (e.g. games) there are standard characters that users are compelled to choose, without flexibility for modifications. This is in contrast with other virtual spaces like Second Life that allow users to design their 3D external appearances. Afterwards, another aspect playing an important role in designing the external appearance is the individual's experience, the individual's subjective opinion about aesthetics and the individual's emotions derived from the two previous terms-- in general, the visual self-sense.

User experience is the key stage which influences the individual's belief about themselves and their physical appearance. The user experience may be conceived as the sensation of how someone perceives and interprets something that they are surrounded by, and seeing possibilities for the next interaction. Consequently, user experience places emphasis on the subjective positive aspect of human – computer interaction, which is associated with the definition of usability and user satisfaction. User experience encompasses more than just satisfaction.

Nielsen stated that satisfaction is associated directly with aesthetics; he claimed that satisfaction has to do with emotions, a common quality between aesthetics and user satisfaction (Nielsen, 1999). Aesthetics is an aspect involved in this process and connected directly with the individual's perception influencing the creation of a 3D avatar. The individual's judgment about aesthetics, beauty, or what is pleasing is based upon personal, social and cultural background (user experience). At this point, it is worth noting that the way an individual illustrates his 3D self, is affected directly from individual's behavior (character) and the individual's expectations in 3D world via the 3D "incarnation" (Ducheneaut, 2009).

Creating a 3D character is associated with the user's body image and physical appearance. This is connected directly with aesthetics and psychology and is influenced by the user-experience. The perception of external appearance is affected by the subjective experiences, a phenomenon that occurs in

all kinds of interactions. It is consequently an essential tool, reinforcing the design of 3D representations and its impact, equally interpreted by an avatar to the user-owner respectively.

2. The Role of User Experience in 3D Avatar Design

Experience is like an episode emerging from the dialogue of a person with the world through his actions; it is a track of time via sights and sounds, feelings and thoughts, motives and actions. All these are interrelated, stored in memory, labeled, relived and communicated to others (Hassenzahl, 2013). Otherwise, experience arises from the integration of perception, action, motivation and cognition in an inseparable meaningful combination. Another definition states that experience is determined before, during and after interacting with a product, system, service or an object. Feelings and experience are set up individually representing each member of a group and are assessed during the interaction (Law, Roto, Hassenzahl, Vermeeren & Kort, 2009). Essential experience is a totality, engaging the self in a relationship with an object in a situation. Pine and Gilmore (1998) divided experience into the categories of passive and active experience, as well as classifying experiences that are immersive as opposed to those that are absorbing.

There are three types of experience:

- Experience: Happens under the conscious stream of self-talk. Assessing goals relative to the people, products and environment that surround them at whatever time.
- An experience: Is characterized from interaction through products and emotions, has a beginning and an end, with integral formation in one's memory. It also inspires emotional and behavioral changes to the experience.
- Co-experience: Has to do with user experience in social contexts, which is created together or shared with others. People find certain experiences worth sharing and lift them up to share attention (interpretations by others). It reveals the individual experiences and the interpretations that are determined by the physical or virtual presence of others.

User experience covers various meanings from traditional usability to beauty, affecting technology use (Norman, 2004). People control their outcome emotions, tending to portray positive experiences to others (Koskinen, et. al., 2002), and this positive depiction of experience is noticeable through the tool of technology that creates the experience. The positive emotions and meanings cover a universal psychological need. The path of designing an experience noted by Buxton (2007) is based on how someone feels acting through a product, the moment it is used, the moment – by-moment experience. The notion of experience focuses on how something is practiced and the aesthetics of interaction (Buxton, 2007).

The design experience is applied on three levels: *What*, *How* and *Why*. *What* is contemplated by the product's functionality, the things people can manage via an interactive product. *How* is tied to the product and its context of use, presenting an action through an object. Consequently, user experience depends on the designer who is responsible for providing a usable way with aesthetic delight. It makes the interaction with the product experiential through sensual aesthetics and a novel arrangement. *Why* clarifies the needs and emotions involved in an activity, the meaning, and the experience. The sequence of these levels starts first from the *Why* to set the tone, followed by the product's functionality (*What*), to *How*, the last act of the functionality (Hassenzahl, 2013).

Hassenzahl and Tractinsky (2006) refer to two ways of handling emotions in user experience; one line of research emphasizes that emotions are derived as effects of product usage. The second one

focuses on the previous product use and evaluative judgments. Aesthetic experiences consist of the user's idiosyncrasies and taste regarding an object. Therefore, it is the common objective point between individuals and designers (Leder, Belke, Oeberst & Augustin, 2004). Designing aesthetics is directly connected with affective responses and reflective thoughts (Hassenzahl, 2013).

3. The Role of Aesthetics in 3D Avatar Design

The history of the notion of aesthetics comes from ancient times and is connected with the concept of beauty influenced by the development of art in six great civilizations: Greece, Egypt, Mesopotamia, Rome, India and China. The origin of the word "aesthetics" comes from the Greek word 'aisthanomai', which was defined by the Greek philosopher Plato as an object's beauty, based on its proportions, harmony and unity (Hoffmann & Krauss, 2004). Plato also posited that traditionally, aesthetics correlate directly with arts, architecture, natural landscapes, and with beauty. At the same time, Aristotle believed that beauty came from order, symmetry and definiteness. The Greek word 'aisthanomai' was expanded and enriched through association with several English terms such as "sensations," "perception," "appearance," "mind" and "knowledge," enabling philosophers to articulate the notion of aesthetics (Theuma, 2007). In 1750, the German philosopher Alexander Gottlieb explained about aesthetics that people discover the world through perceptual experience and thus through their senses (Hoffmann, & Krauss; 2004, Theuma, 2007). Similarly, Cawthon and Moere (2006) also proposed that aesthetics are seen as actions that rekindle the body and the mind, awakening the senses, often as a result of the user's personal, social and cultural background.

In addition, "aesthetics" is defined as the philosophy of theory of taste or the perception of the beautiful in nature or art (Oxford English Dictionary). Nielsen (1999) and Hoffmann and Krauss (2004) add that aesthetics combine and explain also visual aesthetics, which is identical to the previous definition (perception of beauty or taste). Udsen and Jørgensen (2005) stated that the term "aesthetics" was created for the academic world and has to do with works of arts or with works about the sense of beauty. Huxley set his definition of aesthetics as a list (Quoted in: Hjelle & Ziegler, 1976): A beauty in appearance, visual appeal, an experience, an attitude, a property of objects, a response or judgment, and a process.

As noted above, the main term that is associated with aesthetics is beauty; many people think that if something is aesthetically attractive, it is therefore beautiful (Filonik & Baur, 2009). Beauty, according to Tractinsky (2004), may be conceptualized as the quality of use of an object and virtuosity. Even so, during the Renaissance period beauty was considered a consequence of nature (Tractinsky, 2004). Grounded on this, Kant suggested that 'beauty is in the eye of the beholder,' identifying two types of beauty-- pure and conditional beauty (Udsen & Jørgensen, 2005; Mbipom & Harper, 2009). Pure beauty means the true nature. People learn from birth some standard things about beauty, and as they grow up all these standards are enriched or changed depending on life experiences (Hassenzahl & Tractinsky, 2006). Objects can be classified aesthetically depending on the mental ideal picture of the person (Mbipom & Harper, 2009).

In the late eighteenth century, aesthetics were officially considered part of the general language (Lavie & Tractinsky, 2004), and as a consequence, some theories were established about aesthetics, adapting them to areas which involve beauty and art.

People perceive and translate differently the notion of aesthetics according to their background: aestheticians who are philosophers and committed to studying aesthetics, aside from determining aesthetics, have attempted to prove facts about features and measurements of aesthetics. Artists have

been interested in the development and study of the concept of aesthetics in art, such as paintings, literature, poetry and music. Psychologists are concerned with understanding the mental process within the aesthetic appreciation and the aesthetic behavior as it is exhibited by humans. Media aestheticians explore the role of visual aesthetics and their effects on human computer interaction, as well as the effect of aesthetics in interaction design.

Against this background the study of aesthetics is split into two components: a) philosophy of arts and b) aesthetic experience of non-art entities (Hassenzahl & Tractinsky, 2006; Cawthon & Moere, 2006). From the part of the philosophy of arts, according to Postrel (2002), aesthetics pleases and liberates the masses. Therefore, aesthetics is defined as an artistically beautiful or pleasing appearance (America Heritage Dictionary of the English Language), as well, in accordance with Merriam – Websters Collegiate dictionary, a pleasing appearance or effect: beauty (Merriam – Websters Collegiate Dictionary). From the perspective of non-art objects, the term which is connected directly with aesthetics is the visual sense, occupying almost half of the brain (Ware, 2008).

According to the explanations above, the first opinion about aesthetics is the salient expression of what is beautiful, which shows the hidden qualities of a person via their physical appearance. This consensus indicates that people gain benefits or attempt to avoid sanctions via their appearance (Tractinsky, 2013). Visual aesthetics can be viewed from three perspectives: design perspective, psychological perspective and practical perspective.

- Design perspective: Through this view, aesthetic is derived through the consolidation of the artifact (virtual world) and the affected individual. Visual aesthetics is considered as a dimension that increases other aspects of the design and the overall user experience.
- Psychological Perspective: Visual aesthetics research in Human - Computer Interaction (HCI) is directly related with positive psychology. This positive influence regards emotional and cognitive processes, improving satisfaction and well-being.
- Practical Perspective: There are two aspects of this perspective. The first describes aesthetics as the factor that differentiates similar products, and the second is about the interrelation between aesthetics and information technology.

Beauty depends on two aspects: a) The object's physical properties which include harmony, symmetry and complexity, and b) the opinion that the person has about the object, whether it is beautiful or not. These two aspects have been used together consciously or unconsciously (Tractinsky & Hassenzahl, 2005). In addition, beauty is divided into three levels: two of them are unconscious and the one is conscious.

- Visceral level: It is immediate (good or bad, safe or dangerous) with minimal learning. It is the point where beauty is linked up with the target itself; what can be immediately perceived is what counts.
- Behavioral level: It is gained through understanding and mastering a product (learning skills). Behavioral and visceral are the two subconscious levels which bring on true emotions.
- Reflective level: The final level, reflective, is about consciousness and awareness of emotional tones. It uses prior experiences and one's own self-image and personal meanings to evaluate any experiences.

Visceral and behavioral levels assist towards the perception of beauty and goodness, but they can be perceived only after rendering of the contemplative layer. Beauty is an end (not a means) which satisfies a general human need (Norman, 2004).

4. The Role of Psychology in 3D Avatar Design

An area that is directly connected with aesthetics is psychology. The degree of how aesthetically beautiful something is depends on feelings and is subjective. According to aesthetics, psychology is the key point on how a person should perceive something and how an image will be positioned in a user's mind and how it will generate an experience (Tractinsky, 1997). The essence of this aspect relies on feelings that are considered to be the main factor on how a person should accept something positive or negative, consequently, the proportional experience. Psychology also examines the aesthetic behavior of humankind through a given stimulus of interest (Raja, Bowman, Lucas, & North, 2004).

The aesthetics of an object depends on the complexity of the object up to saturation point. Berlyne (1960) proposed the arousal theory, which presents how a user should respond to an object aesthetically. Berlyne argues that in arousal theory there are three sets of variables (Quoted in: Jacobsen, Schubotz, Hofel & Cramon, 2006):

- Psychophysical variables: The physical properties of the object are presentable, for example, color, size, strength, brightness, and hence onward.
- Ecological variables: These variables portray the meanings of an object or the connections with a person's life.
- Collative variables: This category concerns the extent of visual object's elements all at once or separately, similar or different.

Hassenzahl and Tractinsky (2006) argued that psychological aesthetics originate from the human behavior. According to the authors, for users who were exposed to a visual stimulus, aesthetic pleasure increased. When the participant was mentally overloaded and the complexity of stimulus increased, the aesthetic pleasure was reduced.

Jacobsen (2006) suggested a framework for the psychology of aesthetics which consists of seven different aspects: diachronia, ipsichronia, mind, body, content, person and situation:

- Diachronia: The aesthetic choices depend on time.
- Ipsichronia: The cultural and social life of a person affects the person's aesthetic opinions.
- Mind: Aesthetic judgments influenced from the mental model of the visual stimulus / emotions.
- Body: Brain activities could have an effect on the evaluation processes.
- Content: The aesthetic assessment of a stimulus can be influenced by convenience of use.
- Person: The background of a person may play a role for an aesthetic preference.
- Situation: The time, the place and in general the surrounding conditions are components which influence aesthetic choices.

The aforementioned aspects of the psychology of aesthetics are not mutually exclusive, but they should be taken as guides whilst determining aesthetics (Jacobsen, Schubotz, Hofel, & Cramon, 2006).

Emotions are divided into three parts with different purposes to:

- Shape individual's plans and intentions;
- Organize the procedures related to the plans;
- Evaluate outcomes.

Therefore, emotions are generated in social contexts and determine how someone feels, expresses and modifies emotions and the effects that are derived (Forlizzi & Battarbee, 2004).

5. 3D Avatars

A high level of immersion in 3D worlds is facilitated through user interfaces which provide better performance and experience and can be enhanced with 3D avatars (Blascovich, 2002). The word 'Avatar' comes from Hindu avatara, meaning the descent of god or incarnation. The avatar is a representation or the ideal identity of the user (Martin, 2005). An avatar is not only a label or a name of a 3D world participant; it is a digital depiction (graphical and textual) that is controlled by the creator, and its role is represented by responses to the actions of others. Avatars are like user-controlled puppets (Bell, 2008).

Danzico (2010) argued that avatars are not pretty faces, but they affect both the message that is received and also its interpretation. Blascovich (2002) said that avatars represent a controllable 3D embodiment of the user (Blascovich, 2002). The outfit and the role of an avatar in the virtual environment indicate the behavior and some characteristics of the user. The design of an avatar as mentioned above, demonstrates how a user realizes their individual self and their intentions (Schultze & Leahy, 2009).

In a similar manner Boberg, Piipo and Ollila (2008), contented that an avatar can reflect the role of a person in the virtual world, but they suggested that if an avatar is realistic, but not enough, then it is a 'zombie' (Boberg, Piipo, & Ollila, 2008). A similar statement comes from Danzico (2010) who said that the more realistic an avatar looks, the less confrontational it is. Many users change their avatars in four ways: for events (seasons, holidays), affiliations (sports team, company), social causes (awareness, national causes, elections) and status (points, color, and demonstrations of beauty or wealth) (Danzico, 2010).

Avatars mediate users in the virtual universe, obtaining all the sensory information from the environment (Castronova, 2003). Schultze and Leahy (2009) argued that 3D characters are connected with online role-play, and most users learn from their day-to-day interaction with their incarnation. Schultze and Leahy (2009) associate the following features with avatars:

- A body that has a form (human, animal, and machine) and features such as shape, skin, eyes, hair and are available to be customized.
- Existing objects like clothes, furniture, weapons and currency.
- Things that interact with an avatar and vice versa.
- A personality profile which includes name, group affiliations and interest.
- An additional camera besides the virtual eyes of avatar.
- Voice, open and private chat, note card and textures.

Finally, Vasalou, Joinson, and Pitt (2007) suggest different aspects of avatars classifying them into the private aspect of the self and the public expression. Private facet-self originates from the interpersonal consciously communicating and enhancing the revelation of the self. Public facet-self represents the knowledge of the experience and what the user perceives as a social entity. Usually people (who create and publish their avatars) are attracted and affected from others opinion (Vasalou, Joinson & Pitt, 2007; Vasalou & Joinson, 2002).

5.1 3D Identity

The positive opinion about physical appearance is an important factor to predict self-perception (Vasalou, Joinson, & Pitt, 2007), and a physical participation with an activity through aesthetic intervention increases self-esteem (Huxley 1943). As Carl Rogers (Hjelle, 1976) proposed, self-structure is produced through the interaction between the human and his surroundings. Self-perception is derived from some elements of the socialization process (Hjelle & Ziegler, 1976). One of these elements is the human need to be accepted and loved by their respective community, which is called 'need of positive recognition,' and this need is expressed within avatars. Markus and Nurius (1986) stated that 3D environments are places that individuals can explore their self through avatars.

Users are designing avatars to display their 'stable self' as they participate continuously in an online environment (Vasalou, Joinson & Pitt, 2007). Social interactions are mediated by an avatar created by users to project their identity and actions into the virtual world.

Creating an avatar simultaneously entails the creation of an identity, and it might resemble its creator, or has some common or different elements with them. Identity is a significant element of self-concept. Self-concept comprises from the thoughts and feelings of a person, and identity is the part of the self 'by which we are known to others' (Stone, 1990). The meaning of identity is a public process that includes: 1) identity announcements that are required individually, and 2) identity placement which is made by others who approve the identity announcement. The combination between placement and announcement establishes identity (Altheide, 2000). Recent research shows that users discover aspects of their ideal selves within avatars influencing their identity and self-concept (Altheide, 2000). Goumperi and Tolika (2008) wrote about our self-image that it is separated into physical, emotional, mental and the social components. Avatars are the expressions of the true self (Schultze & Leahy 2009; Taylor, 2002).

5.2 Physical Appearance – Characteristics

Physical appearance is defined as self-perspective, including self-perception and self-attitude. It involves thoughts, beliefs, feelings and behaviors. The subjective experience of physical appearance is often more psychosocially powerful from social appearance (Cash, 2004; Forrester, 2000). Body image is investigated in clinical psychology and psychiatry and in recent years has expanded to other areas such as social and behavioral sciences (Tractinsky, 2013). The physical appearance of people influences their social interaction, especially attractiveness, but they are affected not only from the beauty of others but also from the aesthetics of nature, of architecture and of artifacts. According to Lindgaard (1994), to evaluate the physical appearance of something takes 50 milliseconds, with another author claiming that one does not need more than half a second (Tractinsky, 2004).

Human appearance is affected aesthetically according to Transctinsky and Hassenzhal (2006) from human to human interactions. The authors demonstrated that people base their opinion about someone

on their physical appearance; thereafter if someone is perceived as good looking then the attitude towards that person will be positive.

Vitruvius Alberti (Tractinsky, 2004) defined beauty as the wholeness of a body ‘is a great and holy matter.’ Dion Berscheid and Walster (1972) determined that the impact of the person’s physical appearance is associated with social interaction (Tractinsky, 2004). Moreover, Alexander (1966) classified human thinking according to aesthetics as essentialist and functional. Anyone who is aesthetically essentialist is undisclosed and seen as a unit. The functional thinking person is like a receiver and a reference point and thus is ready to communicate (Raja, Bowman, Lucas, & North, 2004).

6. HCI in 3D Avatar Design

Traditionally, Human-Computer Interaction and aesthetics are the areas that enhance the positive or negative feelings about the user experience of technology. Researchers have explored aesthetics, providing definitions from their varying standpoints (Karvonen, 2000).

Nielsen (1999) remarked that simplicity is one of the key elements for the founding of a usable web site. Simplicity is a notion of aesthetics and concerns to the target of the user (to access specific data). He also indicated that satisfaction is one of the five attributes of usability that is associated with aesthetics. The author stated that satisfaction has to do with emotions, a common element between aesthetics and user satisfaction. He argued that the preferences of people follow some general principles of styles, trends or fashions according to what they believe about the definition of beauty (Nielsen, 1999; Karvonen, 2000).

People in general like to experience something beautiful. The nature of beauty increases the attempt of HCI being more user-friendly. Hassenzahl and Tractinsky’s (2006) study revealed that if users perceive an interface as ‘good looking’, then it is easy for them to navigate and get what they want.

Jordan (1998) suggested that aesthetics is the main aspect during the interaction that enhances the pleasure of user experience. Abiding by the same logic, Hassenzahl and Tractinsky’s (2005) work had a heavy influence on the user experience. It combined the interrelation between the user’s mental state (expectations, needs and mood), attributes of the technology (complexity, functionality, and usability), and the setting in which the technology is being used (social gathering, in the workplace, everyday use). In conclusion, aesthetics is a contributing factor for successful communication (Filonik & Baur, 2009).

7. Conclusion

There is substantial literature looking in depth at aesthetics, avatars, user – experience, 3D environments, as well as a wide number of references that mention a combination between them informing the aim of this paper. The theoretical nature of the above areas, and the different research multidisciplinary perspectives that they entail, as well as their overlaps (shown in the graph below), point to the need for developing an understandable theoretical model – the objective of this paper. Naturally, the proposed model needs to be explored further and tested.

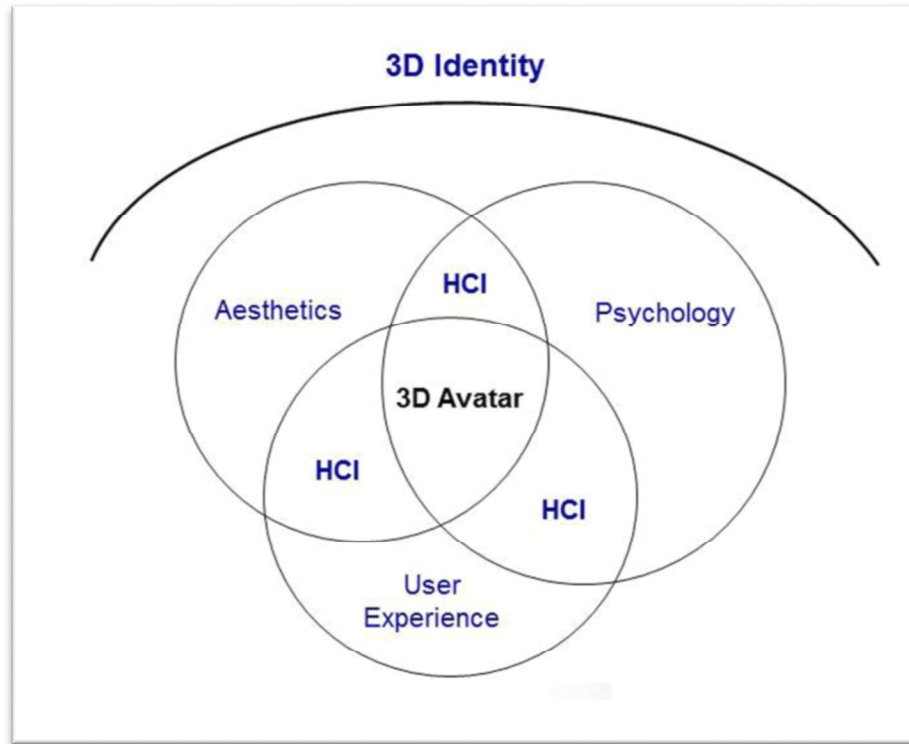


Figure 1: The general theoretical model of the designing process of 3D Avatars

In the meanwhile, and following the formula suggested in the introduction of this paper, there are emerging research questions that combine the different areas elaborated in this paper. These questions are: How can aesthetic experience be defined with 3D avatars? What needs are covered through the procedure of designing 3D avatars? Can avatars be the vehicle for positive user-experience? It is hoped that the proposed model contributes to further elaboration on the subject.

References

- Alexander, W. M. (1966). *Johann Georg Hamann: Philosophy and faith*. Martinus Nijhoff.
- Altheide, D. L. (2000). Identity and the definition of the situation in a mass mediated context. *Symbolic Interaction*, 23(1), 1-27.
- Bell, M. W. (2008). Toward a definition of “virtual worlds”. *Journal for Virtual Worlds Research*, 1(1).
- Blascovich, J. (2002). Social influence within immersive virtual environments. In *The social life of avatars* (pp. 127-145). Springer London.
- Boberg, M., Piippo, P., & Ollila, E. (2008, September). Designing avatars. In *Proceedings of the 3rd international conference on Digital Interactive Media in Entertainment and Arts* (pp. 232-239). ACM.
- Buxton, B. (2007). *Sketching User Experiences: Getting the design rights and right design*. Bedford, Massachusetts.

- Cash, T. F. (2004). Body image: Past, present, and future. *Body image*, 1(1), 1-5.
- Castronova, E. (2003). *Theory of the Avatar*. Retrieved from http://www.cesifo-group.de/pls/guestci/download/CESifo%20Working%20Papers%202003/CESifo%20Working%20Papers%20February%202003%20/cesifo_wp863.pdf
- Cawthon, N. & Moere, A. V. (2006). A conceptual model for evaluating aesthetic effect within the user experience of information visualization. In *Proceedings of the 10th International Conference on Information Visualization, 2006. IV 2006*. (pp. 374-382). IEEE. doi: 10.1109/IV.2006.4
- Danzico, L. (2010). Making face: Practices and interpretations of avatars in everyday media. *Interactions*, 17(3), 11-14.
- Ducheneaut, N., Wen, M. H., Yee, N., & Wadley, G. (2009). Body and mind: A study of avatar personalization in three virtual worlds. In *Proceedings of the 27th international conference on Human factors in computing systems* (pp. 1151-1160). ACM.
- Filonik, D., & Baur, D. (2009). Measuring aesthetics for information visualization. In *Proceedings of the 13th International Conference on Information Visualisation, 2009* (pp. 579-584). IEEE. doi: 10.1109/IV.2009.94
- Forlizzi, J., & Battarbee, K. (2004). Understanding experience in interactive systems. In *Proceedings of the 5th conference on Designing interactive systems: processes, practices, methods, and techniques* (pp. 261-268). ACM. doi: 10.1145/1013115.1013152
- Forrester, M. (2000). *Psychology of the image*. Routledge.
- Fox, K. R. (1997). *The physical self: From motivation to well-being*. Human Kinetics.
- Goumperi, M. & Tolika, D. (2008). *Psychology and Aesthetics* (Doctoral Dissertation), Alexander Technological Educational Institute of Thessaloniki. Retrieved from http://eureka.lib.teithe.gr:8080/bitstream/handle/10184/864/goumperi_tolika.pdf?sequence=1
- Hassenzahl, M., & Tractinsky, N. (2006). User experience-a research agenda. *Behavior & Information Technology*, 25(2), 91-97.
- Hassenzahl, Marc (2013). User experience and experience design. In: Soegaard, Mads and Dam, Rikke Friis (eds.), *The Encyclopedia of Human-Computer Interaction*, 2nd Ed. Aarhus, Denmark: The Interaction Design Foundation. Retrieved from http://www.interactiondesign.org/encyclopedia/user_experience_and_experience_design.html.
- Hjelle, L., Ziegler, D. (1981). *The phenomenological perspective in personality theory: Carl Rogers. Chapter 11*. Singapore: Mc Graw Hill.
- Hoffmann, R., & Krauss, K. (2004). A critical evaluation of literature on visual aesthetics for the web. In *Proceedings of the 2004 annual research conference of the South African institute of computer scientists and information technologists on IT research in developing countries* (pp. 205-209). South African Institute for Computer Scientists and Information Technologists.
- Huxley, A. (1943). *The Art of Seeing (The collected works of Aldous Huxley)*. Chatto & Windus.
- Jacobsen, T., Schubotz, R. I., Höfel, L., & Cramon, D. Y. V. (2006). Brain correlates of aesthetic judgment of beauty. *Neuroimage*, 29(1), 276-285.
- Jordan, P. W. (1998). Human factors for pleasure in product use. *Applied ergonomics*, 29(1), 25-33.

- Karvonen, K. (2000). The beauty of simplicity. In *Proceedings on the 2000 conference on Universal Usability* (pp. 85-90). ACM.
- Koskinen, I., Kurvinen, E., Lehtonen, T. K., Kaski, J., Keinänen, N., & Absetz, K. (2002). *Mobile image*. Edita, IT Press.
- Lavie, T., & Tractinsky, N. (2004). Assessing dimensions of perceived visual aesthetics of web sites. *International journal of human-computer studies*, 60(3), 269-298.
- Law, E. L. C., Roto, V., Hassenzahl, M., Vermeeren, A. P., & Kort, J. (2009). Understanding, scoping and defining user experience: A survey approach. In *Proceedings of the 27th international conference on Human factors in computing systems* (pp. 719-728). ACM.
- Leder, H., Belke, B., Oeberst, A., & Augustin, D. (2004). A model of aesthetic appreciation and aesthetic judgments. *British Journal of Psychology*, 95(4), 489-508.
- Lindgaard, G. (1994). *Usability testing and system evaluation: A guide for designing useful computer systems* (pp. 221-246). London, UK: Chapman & Hall.
- Markus, H. & Nurius, P. (1986). Possible selves. *American psychologist*, 41(9), 954-969.
- Martin, J. (2005). Virtually visual: The effects of visual technologies on online identification. In *Proceedings of Anais do DiGRA 2005 Conference: University of British Columbia*. Digital Games Research Conference.
- Mbipom, G. & Harper, S. (2009). Visual Aesthetics and Accessibility. *HCW—EIVAA technical report 2*, 1-48.
- McDonough, J. P. (1999). Designer selves: Construction of technologically mediated identity within graphical, multiuser virtual environments. *Journal of the American Society for Information Science*, 50(10), 855-869.
- Merriam–Webster’s collegiate dictionary*. (11th ed.). (2005). Springfield MA.
- Nielsen, J. (1999). *Designing web usability: The practice of simplicity*. New Riders Publishing.
- Norman, D. A. (2004). Introduction to this special section on beauty, goodness, and usability. *Human–Computer Interaction*, 19(4), 311-318.
- Pine, B. J. & Gilmore, J. H. (1998). Welcome to the experience economy. *Harvard Business Review*, 76, 97-105.
- Postrel, V. (2002). *The Substance of Style*. Harper Collins: New York.
- Raja, D., Bowman, D., Lucas, J., & North, C. (2004, May). Exploring the benefits of immersion in abstract information visualization. In *Proceedings of Immersive Projection Technology Workshop*. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.205.235>
- Santayana, G. (1904). What is aesthetics? *The Philosophical Review*, 13(3), 320-327.
- Schultze, U. & Leahy, M. M. (2009). The avatar-self relationship: Enacting presence in second life. In *Proceedings of the International Conference Information Systems, paper 12*. Retrieved from <http://aisel.aisnet.org/icis2009/12>
- Stamps, A. E. (2006). Entropy, Berlyne, Kaplan: Integration of two aesthetic theories. Retrieved from http://www.researchgate.net/publication/264275435_Entropy_Berlyne_Kaplan_integration_of_two_aesthetic_theories

- Stone, G. P. (1990). Appearance and the self: A slightly revised version. In D. Brissett & C. Edgley (Eds.) *Life as theater: A dramaturgical sourcebook*, (pp. 141-62). New Jersey, US: Transaction Publishers.
- Taylor, T. L. (2002). Living digitally: Embodiment in virtual worlds. In R. Schroeder (ed.), *The social life of avatars: Presence and interaction in shared virtual environments*, (pp. 40-62). London: Springer-Verlag.
- The American Heritage® Dictionary of the English Language, Fourth Edition. Retrieved February 12, 2015, from <http://dictionary.reference.com>
- Theuma, M. (2007). *Evaluating the Aesthetics of Websites* (master's thesis). Retrieved from the faculty of Life Sciences, University College London.
- Tractinsky, N. & Hassenzahl, M. (2005). Arguing for aesthetics in human-computer interaction. *I-com*, 4(3/2005), 66-68.
- Tractinsky, N. (1997). Aesthetics and apparent usability: Empirically assessing cultural and methodological issues. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 115-122). ACM.
- Tractinsky, N. (2004). Toward the study of aesthetics in information technology. In *The Proceedings of the 25th Annual International Conference on Information Systems, Washington, DC* (pp. 771-780).
- Tractinsky, N. (2013). Visual aesthetics. In: S. Mads & D. R. Friis (eds.), *The Encyclopedia of Human-Computer Interaction*, 2nd Ed. Aarhus, Denmark: The Interaction Design Foundation. Retrieved from http://www.interaction-design.org/encyclopedia/visual_aesthetics.html
- Udsen, L. E. & Jørgensen, A. H. (2005). The aesthetic turn: Unravelling recent aesthetic approaches to human-computer interaction. *Digital Creativity*, 16(04), 205-216.
- Vasalou, A. & Joinson, A. N. (2009). Me, myself and I: The role of interactional context on self-presentation through avatars. *Computers in Human Behavior*, 25(2), 510-520.
- Vasalou, A., Joinson, A. N., & Pitt, J. (2007). Constructing my online self: Avatars that increase self-focused attention. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 445-448). ACM.
- Wallace, P. & Maryott, J. (2009). The impact of avatar self-representation on collaboration in virtual worlds. *Innovate: Journal of Online Education*, 5(5).
- Ware, L. (2008). Worlds remade: Inclusion through engagement with disability art. *International Journal of Inclusive Education*, 12(5-6), 563-583.