SENSES IN USER EXPERIENCE OF INTANGIBLE PRODUCT DESIGN

Thirathep Chonmaitree[1]

Received : June 1,2022
Revised : June 24, 2022
Accepted : July 27,2022

[1] (Ph.D) Independent Academia, Bangkok, Thailand
E-mail: chonmaitree_t@silpakorn.edu

Abstract

In the electronic consumer market, both digital and physical products exist. However, in this new era of information technology and virtual space, humans are more involved with digital products. Most physical products are normally experienced by the human senses through sense organs. Digital products are distributed and utilized through electronic devices, which means the digital products are represented within a computerized system. Hence, the sense of seeing is the most crucial sense for experiencing digital products. The electronic device has been used to present digital media within the computerized system. There are three objectives for this article. First is to present the different types of products – focusing specifically on intangible products. The second is to explore the different senses of the human body and how they will be used in intangible products. The third is to recommend the possibility of producing and using digital elements in delivering the sense. Literature research was also used to gather information from different sources online. Representational theory

and sensory semantic theory are the two methodologies for analyzing data and recommending the possibility of producing digital elements to achieve the right sense. The output of intangible products is primarily dependent on the display device and its peripherals. The primary output device is either a monitor, a mobile screen, or a speaker, which can output both visual and audio data. Eyes and ears are employed for data detection. Any other senses would need to rely on the characteristics and qualities of digital elements on the screen. In conclusion, intangible product design must rely heavily on interface design to convey meaning to the user. Connecting with the intangible via the remaining sense by conveying representational elements can be comparable to the physical product's sense. In the metaverse, there could be a second revolution that creates multiple senses to replace the real world's environmental senses.

Keywords : User Experience, Intangible product, Product design, Senses

Introduction

User experience is what most product designers are concerned about when designing any kind of product these days. It becomes a major consideration for the customer as well when experiencing one specific product. The sales growth may be up or down depending mainly on user experience with the usage of each product. The design itself plays a critical role in the interaction between the user and the product. Each product contains different materials or looks and feels specifically. The materials, or the look and feel of the product, develop the product's senses and also serve as an interface between the product and its user. That is how a tangible product, physically, works toward the user or customer in general. As we live in this information technology era, digital products grow significantly in enhancing one's life on a day-to-day basis. Most digital products need to rely on an electronic device such as a computer screen or mobile phone to deliver their content and interact with a user through the method of coding development. These methods can manipulate elements on the electronic device to move and interact with users. The users' perceptions of these devices are predominantly visual. The question remains how the user can obtain information through different human senses other than sight. This academic article examines the type

of product in connection to the human senses and the two most significant factors. After defining the product and human senses, the analysis of a digital product and the relevant human senses are matched as recommended criteria for product design research, combining sensory components into a digital product.

Objectives

1. Explore the different type of products focusing on intangible product
2. Categorize human senses that contribute to the user experience of intangible products.
3. Develop criteria for incorporating human senses into intangible products to enhance the user experience.

Methodology

This article's primary data collection and analysis strategy was as follows:

Collecting data

In order to obtain information for this article, a review of literature from disciplines linked to the topic provides ideas and an overview of the field. The novel concept and discovery have stimulated some fresh ideas for the subsequent analysis procedure. The current review gives insight on what the future holds for this trendy field.

Analyzing data

In collecting data and processing it into information, semiotic or representative theory of perception and sensory semantic theory will be used to analyze the data. The representation theory of perception, from the basis of philosophy, describes how ideas of things come from the brain receiving sense-data, not only actual material or images of real material (The basic of philosophy, 2022). The sensory semantic theory was developed by D.L. Nelson to explain the effect of pictures on human memory. Nelson said that humans tend to remember pictures better than words. Images or pictures contain hidden messages and meaning that have a superior effect on human memory than words do. This is also called the picture superiority effect, in which the picture encodes its information and delivers that information better than the word. What the old said "a picture is worth a thousand words" applies to this theory and effect (Simpleshow, 2018). The result of this article will suggest the possibility of user experience through senses in the intangible product. With this idea, more user experience research can be done and digital products can be made for the future of the metaverse.

Types of Products

Dhara classified products into durability, industrialization, and consumerism. In durability, there are durable and non-durable products within this classification. As for industrial products, there are natural, supplied, manufactured, and farm products. Shopping, specialty, unsought, and convenience products are in the consumerist classification (Dhara, 2022).

Forsey described that one way to categorize products is by using the characteristics of the product, price, and usage habits of the consumer. There are categorized as specialty products, convenient products, shopping products, and unsought products (Forsey, 2021).

The Government College for Women, Gandhi Nagar defined the classification of products, also known as product types. There are 3 forms of products in their classification:- 1) Organizations, Ideas & Places, Persons 2) Consumers 3) Industrial (Nagar, 2022).

Bhasin classified product types into marketing as augmented, potential, differentiated, and customized products (Bhasin, 2018).

Indeed Editorial team defined products into different categories as informed, mandatory, specialty, and convenience products (Indeed Editorial team, 2021).

Tangible goods or products are things that are presented in physical form for the user to experience. Users or customers can experience them through the physical sense of the human organ. Intangible goods or products are things with no physical form for the user to touch and feel. Some parts of the human body can only understand intangible things when they are represented by physical things (Decker, 2019).

John Spacey gave some examples of intangible products in Simplicable as entertainment, media, culture, software, knowledge, travel, digital experience, education, and much more. Intangible products can also include different services (Spacey, 2018).

Alexandra Vazquez wrote an article about intangible products, explaining that intangible products are not physical. Most intangible products are digital products. Some examples of intangible products are software, education, data, copyrights, trademarks, and domain names. Vazquez puts intangible products into five groups: customer lists, goodwill, business software, intellectual property, and media (Vazquez, 2022).

Figure 1

Type of Products

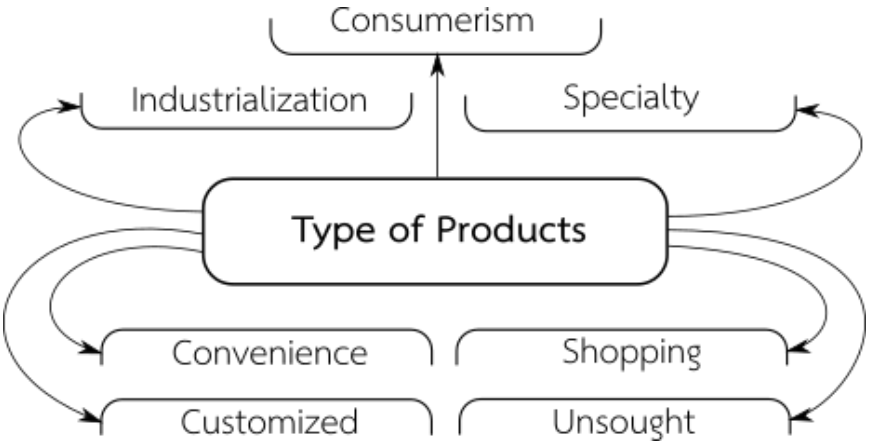


Figure 1 shows the summary of all the reviews regarding the types of products by discussing the types of products and the usages or functions of the products. Some products might be overlapping in two or more categories. All the categories of products in Figure 1 can be tangible or intangible products. The form of the product can be changed into a digital or physical product in the future.

Product Classification

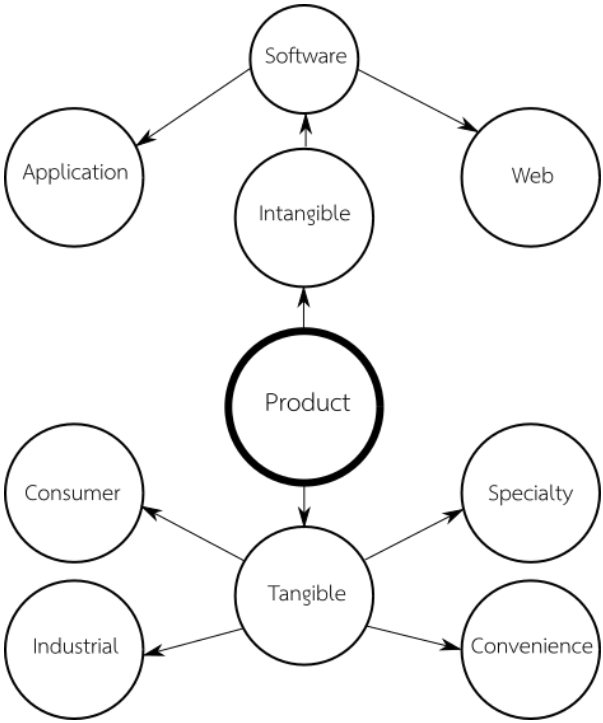
As for this article, product classification will be divided as shown in figure 1.

Product classification for this article's purpose is shown in figure 2. Products are divided into 2 types : tangible and intangible. The tangible side can be divided into consumer, industrial, and convenience. Consumer products are comprised of products for consuming and taking. Most products in this category are dairy products, household products, daily used products, and more. An industrial product is a product that serves the industrial process within the cycle of industrial production. A specialty product is a product with specific needs. These types of product development are within the specific interests of each individual. Presently, there is a specialty product store for each special interest. A convenience product is a product that enables comfort and provides comfort to the consumer at the end. On the other hand, intangible products cannot provide the message through all the basic human senses. In this article, software is the only intangible product that became famous throughout the entire process. Software products can be divided into applications and web products. Application means both standalone applications and online applications on all devices. Web means web application with front-end and back-end development. This also includes website design, e-commerce, and any other type of web development with specific functionality. This is the scope of intangible products for this article. This article discusses about how people interact with and feel about products that aren't physical. It does this by focusing on the front-

end design of a software product, which includes graphic or design elements.

Figure 2

Product Classification



Types of Senses

The seven senses foundation wrote that senses can be classified into 7 senses. There are hearing, touch, smell, proprioception, sight, taste, and vestibular (7 Sense Foundation, 2022).

Gray described that there are 5 types of human senses : hearing, touch, taste, smell, and eyesight. In addition, the lesser-known senses are kinaesthesia, nociception, chronoception, equilibrioception, thermoception, and proprioception. This article also said that there are senses that humans don't have : electroception, magnetoreception, polarized light, and multisensory perception (Gray, 2017).

The 7 senses by Mailloux and Smith are classified and described as touch, vestibular, sight, taste, hearing, smell, proprioception (body position), and vestibular (Movement and balance senses) (Mailloux and Smith, 2013).

There are 18 senses in the human biological system. There are taste, touch, smell, hearing, sight, time, hunger, chemoreceptors, thirst, equilibrioception, pressure, magnetoreception, stretch receptors, itch, tension sensors, proprioception, thermoception, and nociception (Hiskey, 2019).

In Hungerford's course on Rudolf Steiner's philosophy, the twelve senses concerning human development, Hungerford will give a lecture about all 12 senses, which include more than the 7 senses that are theoretically accepted. All 12 senses are : balance, touch, concept, hearing, ego, self-movement, smell, temperature, sight, language, life, and taste (Hungerford, 2012).

As for the belief that there are only 5 senses to send and receive information to the brain, there are actually 8 of them. They are, as usual, those 5 senses - taste, sight, smell, touch, and hearing - and 3 additional senses are interoceptive (internal), vesticular (balance), and proprioceptive (movement) (Peads in a pod, 2021).

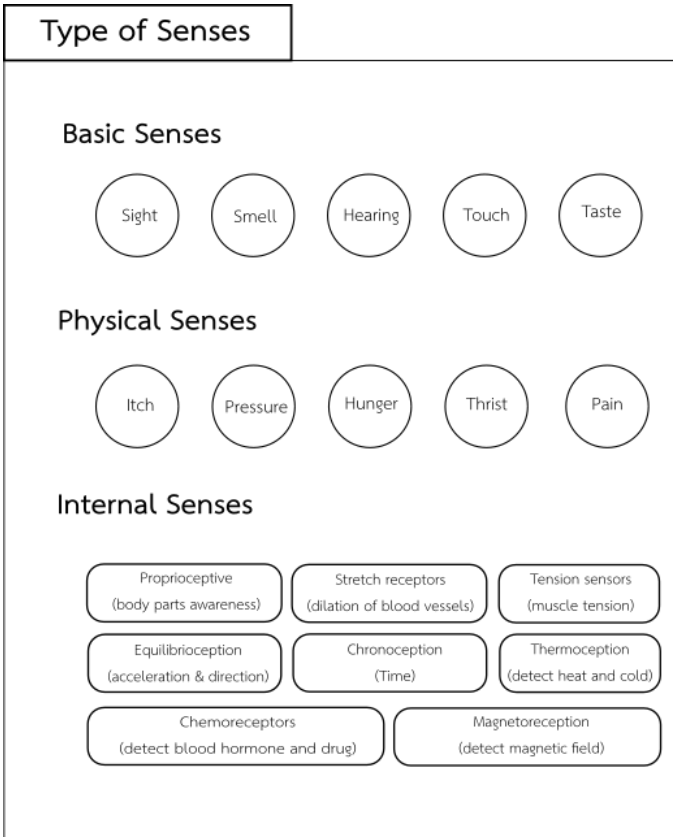
Rymanowicz discussed that there are 2 senses – proprioception and vestibular - that interface with one's surroundings. The sensory process is the combination of those 2 senses with the regular 5 senses. All seven senses work together to shape cognitive, speech, social learning, behavioral, and motor development (Rymanowicz, 2014).

According to Dr. Erin, human senses are complex organisms in biological bodies in order to experience the world and send messages for the body to interact and respond to the environment of the world (Eatough, 2021).

Based on multiple reviews from different sources about human senses classification, there are different ways of looking at senses. Some new senses of human organs are created and developed for further research in the future. Those senses might not be possible to integrate into computerized intangible products. Extra peripherals might be needed in connecting between a computer and human organs to perceive stimulated agents. For example, in 4D movies, an extra chair has been built with a vaporized device in order to sprinkle some water or scent on the human body. This is to create a different environment in terms of sense with eyes. In addition, some of the lesser known senses, such as equilibrioception or thermoception, may need some more research and design in perceiving and evaluating those senses accurately and thoroughly. Another idea in the design aspect for those new invented senses is the design standard for future reference.

Figure 3

Type of Senses



Sense Classifications

As for this article, senses will be discussed as in figure 3.

These are the senses that can be involved with the intangible product of this article. First, there are all 5 human senses – sight, touch, hearing, taste, and smell. The next 4 new senses can be involved in this intangible product. There are pain, temperature, movement, and balance. These new senses, which were discovered later, have illustrated some important research processes and design methodology for any product with sensory cooperation in it. Pain is the sense that can be obtained from skin or any other human sense organ (the list and description of sense organs will be discussed later). The process of getting sensitive information from the sense organ through to the brain will be discussed in the next section. Temperature is the sense of the body to receive higher or lower temperatures from the environment. Movement is the feeling of the body moving or shifting from one place to another. Balance is the function of body limb nodes (arms and legs) to maintain the balance of the body and prevent it from falling. In each sense, organs can specifically receive a message from the environment differently, which will be discussed in the next section.

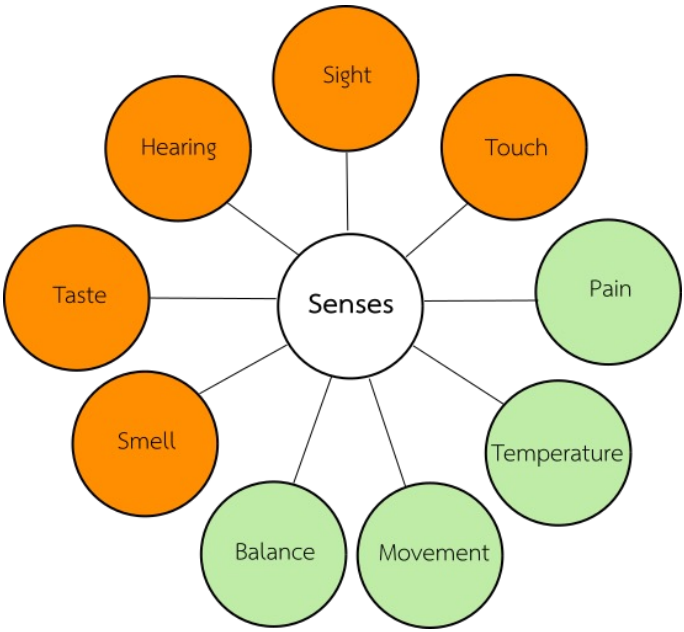
How human process senses?

Sprouse discussed how sensory organs communicate with the brain. Nerves are the connection between sensory organs and the brain. Nerves work as an interface between the brain and sensory organs, sending information with electrochemical impulses. Information about the environment is flooded and sent through the nerves with the shape, feel, and color of the environment. All information about the environment and objects is sent to let the brain examine their actual being (Sprouse, 2022).

Groeger argues that each one perceives information about the world differently. Gathering information and sending it to the brain to process with the right impression of the environment. The combination of senses translates into how one perceives the emotions of others. Smell is linked to emotion and the memory center of the brain, which can make a person feel more emotional. The wiring of senses within the process creates effective and creative art illusion and innovative invention through the process (Groeger, 2012).

Figure 4

Senses for Tangible and Intangible products



According to research from the University of New York, culture affects the hierarchy of senses like sight, hearing, touch, taste, and smell. The study's findings show that culture and biological factors play a significant role in predicting the sense. A musical specialist would be able to convey a message effectively with sounds even though the testing group is non-musician. With pottery living, the community can deliver the message of shape much better than any other sense. The research finding proves the significant effect of surrounding on the potential for strong growth in the human sense. These indicate how people utilize the sense of perception through the surrounding atmosphere (Asifa et al., 2018).

The human sense is how the brain communicates with the world around us via the human body. If that is correct, there should be more than five senses, as has long been assumed. Consideration of the body's position can be related to the sense of the body itself. For example, close your eyes and touch your finger. How does a human know how to perform certain tasks? Humans are aware of the location of each organ in their body. This is known as proprioception. Everyone is aware of where each body part is. The body knows each bodily component and its features through the use of receptors (Jarrett, 2014).

How each sense deliver information through human organ is shown in figure 5.

Figure 5

Senses and human organs that receive data

Senses	Human Organ
Sight	Eyesight
Touch	Skin
Hearing	Ear
Taste	Tongue
Smell	Nose
Balance	Arms-Legs
Movement	Limb node-Eyesight
Temperature	Skin-Eyesight
Pain	Skin-Eyesight

Product and its representative of senses

According to Figure 3, the organ in the human body that detects information from the surrounding atmosphere accepts multiple types of senses. Tangible or physical products manipulate several human organs by transmitting data for the brain to process and determine the shape of an object in its environment. Vision collects information through the eyes, which may acquire the most information, including shape, form, and environmental visual senses. Skin is the most commonly utilized human organ for experiencing a physical item in close proximity and in great detail. The human brain can determine an object's shape and form by touching it. If the thing is capable of producing sound, the ear can detect its signal. The signal data is transmitted to the brain for interpretation and physical object interaction. As with food objects, the tongue can collaborate with sight and touch to transmit taste. In addition to stimulating the taste through the nose, the scent can also stimulate the sense of smell. In the context of food or gastronomy,

nearly all five human senses can be engaged and work in concert to sense the food object to the delight of the brain. Through the limb nodes, which are the arms and legs, one can gain a sensation of balance. Consider, for instance, walking on the balance beam. Cooperation between the legs and hands is required to maintain balance on the balance beam without falling. In addition to aiding in focusing and balancing the body while traveling along the balancing beam, eyesight may be of great assistance. The human skin is an excellent organ for sensing the surrounding temperature. Some surrounding elements, such as snow, rain, sunlight, and wind, can likewise indicate hot and cold temperatures. Pain sensations can also be derived from the skin. The nerve is positioned beneath the skin and is able to detect cutaneous pain. Vision can also analyze data acquired from the eye regarding uncomfortable responses. These are the explanations for the various organs associated with each sense. Most of the senses are used, depending on the type of physical or tangible product.

Figure 6 demonstrates that vision is likely the most important sense for experiencing an intangible product. Intangible products have a single device that engages the consumer by the look and feel of the product itself, or just using graphic media. There are media elements and their functions in graphic media that can represent distinct senses during the process. For instance, movement senses may employ horizontal lines to depict the movement of an item from left to right or right to left. The vertical line can signify ascending or descending. The diagonal line might symbolize either a scream or a shout. It can also signify a character's movement speed. Figure 7 shows the usage of lines to represent movement in digital objects. The image of the balancing beam with a single diagonal line can depict the sense of equilibrium. Curvy lines may indicate smoke or the heat of a hot beverage. The zigzag line alongside the cup of tea can indicate a frozen cup, giving the impression of hot and cold temperatures. As in representation theory, the preceding explanation demonstrates how to employ graphical data to represent the actual physical item or event.

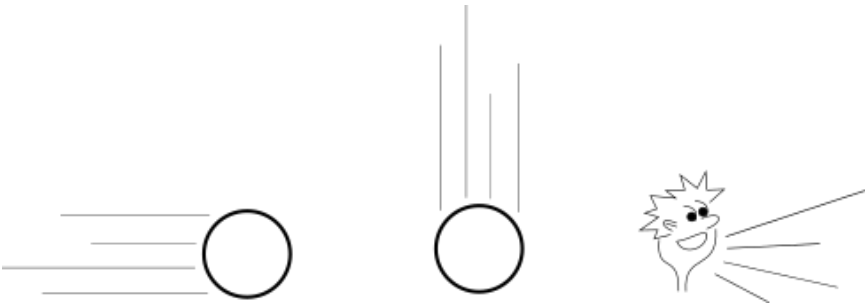
Figure 6

Senses and its human organ with intangible products

Senses	Human Organ
Sight	Eyesight
Touch	Eyesight
Hearing	Ear
Taste	Eyesight
Smell	Eyesight
Balance	Eyesight
Movement	Eyesight
Temperature	Eyesight
Pain	Eyesight

Figure 7

Line that represented senses



A single image of someone wailing or sobbing can symbolize the suffering one experiences in any circumstance. All of these can be gained through human vision and transferred to other senses by human organs. An intangible product, such as a website or application, primarily uses graphical representations, photos or images, and color schemes to convey sensation and emotion through each aspect rather than the actual object in the surrounding environment. As in sensory semantic theory, a picture or image can be more representational than a word, and a single image can convey more than 1,000 words. This visual or actual image is used to express "a superior pictorial effect." Using visuals or photos, especially graphical representation, can be far more effective at engaging the consumer than the real physical product. The new digital media hold an incredible power to stimulate and describe themselves, triggering the human brain to believe in the realism of intangible and virtual objects. This is also described in sensory semantic theory.

How does intangible product express sense ?

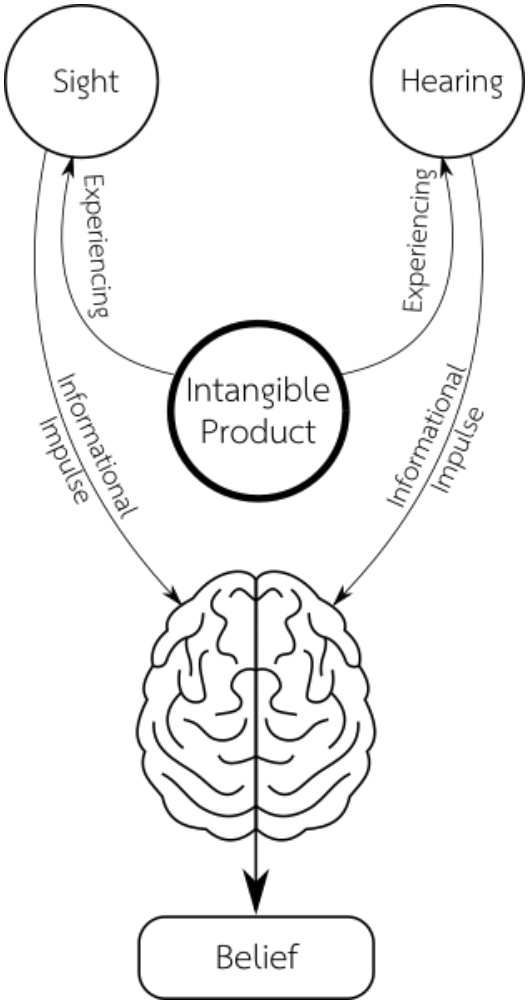
In this era of information technology and digital transformation, many digital products have significantly improved their ability to represent real, physical objects. Compared to their physical equivalents, digital media such as digital photographs, digital voices, online videos, and digital graphic elements can be extremely lifelike. In anticipation of the future metaverse, these artifacts can be realistically incorporated into the metaverse and serve as representations of real-world objects. There are sensory design principles as indicated :- trigger experience, include senses in product strategy, learn about senses, target some senses, avoid sensory overwhelmed, investigate senses relationship, include in research with senses, discover sensory connections toward design elements, include within product strategy some senses, and impose hypothetical sensory constraints (Bowers, 2022). With the sensory semantic theory in place, the human brain is capable of recognizing and memorizing these digital objects as if they were real. The memory of these virtual items can cause the brain to feel and attach to them through the visual sense, which interprets the shape and form of the virtual object rather than the sensation of touch. This occurs when the pictorial superior effect excites the brain and convinces the senses that an ethereal thing is physical. The human sense of experiencing a virtual item differs from the human sense of experiencing a real object. The perception of a virtual object is identical to the perception of a physical object.

Conclusion

This article examines the user experience using software applications and web applications. Both products are intangible, meaning they cannot be physically perceived by human sensory organs. Nonetheless, intangible products benefit from seeing and hearing through the eyes and ears, respectively. The two organs provide informational impulses to the brain, deceiving it into believing, so that people can experience intangible goods. Once the belief is established, the contact between humans and objects or products can become more precise and elicit an emotional attachment to the product, as if it were the physical object itself. Figure 8 depicts the process previously discussed. As we enter the metaverse era, digital materialization will produce more and more means of digitally transforming human life. The ability to create intangible objects that stimulate human senses would be a discipline that bridges the gap between art and science.

Figure 8

Concluded diagram



References

7 Sense Foundation. (2022). *What are the 7 Senses?* http://www.7senses.org.au/what-are-the-7-senses/ Asifa Majid, Asifa & et al. (2018, November 5). Differential coding of perception In the world's languages. *Proceedings of the National Academy of Sciences, 2018. 115 (45) 11369-11376* https://doi.org/10.1073/pnas.1720419115

Bhasin, Hitesh. (2018, September 27). *The 4 Types of products. Marketing91.* https://www.marketing91.com/types-of-products/

Bowers, Micah. (2022). *The Ultimate Experience: A Guide to the Principles of Sensory Design.* https://www.toptal.com/designers/ux/sensory-design

Decker, Fred. (2019, January 31). *What Is an Example of an Intangible Good? Chron.* https://smallbusiness.chron.com/example-intangible-good-35031.html

Dhara, M. (2022). *Types of Product. Business Management Ideas.* https://www.businessmanagementideas.com/products/types-of-product/20612

Eatough, Erin PhD. (2021, December 13). *You have more than 5 human senses. How are you using yours? BetterUp.* https://www.betterup.com/blog/human-senses

Forsey, Caroline. (2021, August 19). *Product Classification: What It Is & Its Impact on Marketing Efforts.* Hubspot. https://blog.hubspot.com/marketing/product-classification

Gray, Alex. (2017, January 09). *Humans have more than 5 senses. World Economic Forum.* https://www.weforum.org/agenda/2017/01/humans-have-more-than-5-senses/

Groeger, Lena. (2012, February 28). *Making Sense of the World, Several Senses at a Time.* Scientific American. https://www.scientificamerican.com/article/making-sense-world-sveral-senses-at-time/

Hiskey, Daven. (2019, September 12). *Humans have a lot more than five senses* — here are 18. *Considerable.* https://www.considerable.com/health/healthy-living/humans-five-senses/

Hungerford, Tom. (2012, February 10). *How do children connect to their world? The Twelve Senses: Rudolf Steiner's* lectures on healthy human development. Course title: The Twelve Senses- what are they and how do they work together to contribute to healthy human development? Melbourne Rudolf Steiner Seminar. https://www.steinerseminar.net.au/children-connect-world-twelve-senses-rudolf-steiners-lectures-healthy-human-development/

Indeed Editorial team. (2021 September 30). *Product Classifications: Definition,* Types and Significance. https://www.indeed.com/career-advice/career-development/product-classification

Jarrett, Christian. (2014, November 19). *Psychology: How many senses do we have?* BBC Future. Source : https://www.bbc.com/future/article/20141118-how-many-senses-do-you-have Published by November 19, 2014.

Mailloux Z & Smith Roley S. (2013, July). *Sensory Integration Development and Early Signs of Difficulties.* Pathways.org https://pathways.org/topics-of-development/sensory/

Nagar, Gandhi. (2022). *Product Classification. Government College for Woman.* https://gcwgandhinagar.com/econtent/document/15871777540COMGENE04-Product.pdf

Peads in a pod. (2021, August 16). *Sensory processing and our 8 senses explained* (yes, 8 not 5!).

Rymanowicz, Kylie. (2014, November 19). *The seven senses: supporting your child's sensory development.* Michigan State University Extension. https://www.canr.msu.edu/news/the_7_senses_supporting_your_childs_sensory_development.

Simpleshow. (2018, March 7). *What is the Sensory Semantic Theory?* Simpleshow. https://videomaker.simpleshow.com/understanding-sensory-semantic-theory/

Spacey, John. (2018, November 17). *18 Examples of Intangible Goods.* Simplicable. https://simplicable.com/new/intangible-goods

Sprouse, Sydney. (2022, May 15). *Making Sense of Your Five Senses.* Ask the scientists. *Source :* https://askthescientists.com/senses/#toggle-id-1

The basic of Philosophy. (2022, May). *Representationalism.* Philosophy Basics. https://www.philosophybasics.com/branch_representationalism.html

Vazquez, Alexandra. (2022, May). *Intangible products. G2.com.* https://www.g2.com/glossary/intangible-products-definition.