



**Trinity College Dublin**  
Coláiste na Tríonóide, Baile Átha Cliath  
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A theoretical methodology to create a disruptive user design for  
Holograms in advertising

By

Juliana Carolina Amezquita Niño

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Supervised by Neill O'Dwyer

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# DECLARATION

I, Juliana Carolina Amezcuita Niño, declare that the following dissertation, except otherwise stated, is entirely my own work; that it has not previously been submitted as an exercise for a degree, either in Trinity College Dublin or in any other University; and that the library may lend or copy it or any part thereof on request.

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# Abstract

Holograms have fascinated audiences since their exposure to the public. It creates a sense of hopefulness towards the technological future, that someday, eventually it will be created for mass use (Johnston, 2016). The investigations made at the moment have focused mainly on their technological development, while in the current digital revolution, smart devices and computers have started to gain focus on their impact on our social life. Computers as social actors is a new social paradigm of discussion and study as they are considered new actors that conform the structure of today's society (Xu, 2020). Thus, Holograms have not acquired a vast permeability yet, little by little it has been inserted in today's life. Music concerts and some advertising platforms have been the main stream channel, demonstrating how it has started to become the newest media to communicate a message. But what do people actually feel when they see a hologram? How could this new tool be used for a maximized benefit without having a quick burnout once it is introduced in the advertising market? This research paper aims to join different methodologies and theories applied in the study of human-hologram interactions, to create a method *to be* applied for the creation of a user guide for Holograms.

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# Introduction

## Background

Since Holograms were invented back in the sixties it has left a print in human consciousness about the potential future. Most of the first exhibitions were held in private conferences but gave enough space to the audience to spread the word to the creative sphere. Consequently, the film industry with new technological advancements for editing, presented for the first-time holograms in a mass communicative way. The Star Wars movie directed by George Lucas in 1984 showed a scene that became famous for a hologram had not been seen before: the robot, R2D2 projects a hologram of Princess Leia asking for help to Luke Skywalker and Obi Wan Kenobi. This scene led the example for the rest of sci-fi films produced. Another iconic example is Blade Runner where throughout the movie the characters use hologram maps and tools, and most recently in Blade Runner 2049 we were introduced to “Joi” an AI program and female hologram that keeps company to people and can fall in love with its users. As these images (film) of this new image (hologram) are proposed to the general public, it has become an accepted element of wonder, knowing that someday the challenge and goal to create and use them as in the movies will be achieved.

At present, we are living in the era of digital revolution. Once a technology is introduced to us, at first it awes us, but surprisingly in a short period of time it adapts in society as it continues to be upgraded and polished. As Ahmed K. Noor, states:

“It was less than 10 years ago that society was introduced to a new computing paradigm: handheld devices that sensed and responded to touch and motion. What was a novel and to some, baffling interface in 2007 has become so second nature that today small children are given their parents’ iPhones to play with—and those children have no problem operating them.” (Noor, 2016)

Immersive technologies have become the closest progress in science to produce the sci-fi holograms depicted in the movies. These technologies recreate the physical world through the use of digital information, creating an enough sensory emulation that generates immersion; they try to integrate the virtual and real-world together.

There are three different “currents” at the moment: Virtual Reality, Augmented Reality and Mixed Reality. The difference between them are as follows. Virtual Reality (VR) uses a headset where 360-degree scenes can be seen as they are in the real world. Augmented Reality (AR) over lays digital information on top of the physical world, being more of a supplement to the physical environment. And Mixed Reality (MR) is a combination of both Virtual Reality and Augmented Reality, where through eye glasses virtual objects can be seen on real space. Mixed Reality is the closest scientific advance to produce holograms

due to its technological nature as the virtual objects are created inside the lenses based on the holography theory (theory and technique further explained later on the chapter).

Mixed Reality does not cut off the outside world, instead it blends the holograms into the psychological environment. Moreover, holographic computing allows users to interact with the holograms. Big companies like Microsoft, Google, Apple, Sony and Facebook (2016) are funding these investigations for low-cost mixed reality systems. Microsoft is an example to the case. It created in 2015 its own HoloLens which included the holographic software and it has shown its different applications in a variety of work fields. While the Mars rover was already in the planet acquiring images for NASA, the institute looked toward the HoloLens to actually explore the sceneries sent. This way they could understand better the landscape where the robot was located and took decisions concerning the rover's direction and speed. The technology has advanced to the point where the software "calculates where 3-D graphics exist in the physical space of the user and keeps track of such input as voice commands and gestures" (Noor, 2016). The HoloLens projects the images onto the perceived physical world and modifies its behavior according to the surroundings plus the interactivity of the users towards the holographic objects. Transforming the physical world into representation of programs and controls mean a vast reduction in the distance between the user and the interface.

Other applications hololenses have had can be seen on other sectors such as in the education field, machine engineering and in construction. For example, another application NASA has given to the lenses has been for the construction of spacecrafts, where engineers interact with the designs of the prototypes through the lenses and can see how they would be in real life. "ProtoSpace allows engineers to test the fitting of all the components and practice the installation procedure at full scale with the actual tools needed to ensure there is enough clearance." (Noor, 2016). The machines being built through holograms reduce the margin of error when the physical production starts. As a result, there is a drastic economic benefit as not a single piece is manufactured through the design process. On the other hand, CAD blueprints of construction sites have been able to be transferred to the hololenses, helping engineers visualize how to fit pumps and pipes and even have a final walkthrough inside the final project. Lastly, education has seen a benefit from the hololens by giving the student immersive learning environments. For example, to have remote classrooms, for touring remote places or to show processes in 3D.

As we have seen, the Hololenses have had a fast incorporation in different fields. The purpose of showing them is to demonstrate how Holograms, as any other technology, is quickly integrating in human life. Furthermore, aside of the creation of holograms, attention towards the holographic computing (interactivity) must be given as Artificial Intelligence (AI) is becoming more cognitive and AI has a strong potential in the future of learning and predicting human behavior. Thus, aside of the technological progression, the social impact of this new technology needs to be evaluated, now that we are just starting to understand how machine learning behaves and how human behavior changes with it.

Scholars are starting to develop a field called “machine behavior” aiming to set ground on technical and theoretical bases to understand how AI, now incorporated in our everyday life, should be considered a social actor. In this sense, they are not mere software’s, but entities with some kind of sociability. There have been some studies about the interaction between humans and Artificial Intelligence to demonstrate how it modifies human behavior. The scope is not on the amount of time being used, but more towards the emotional development that has carried the interaction with this one. For example, digital assistants have proven to be a problem of concern as to how normal it should be for children to treat the devices, when the devices are built to sound almost humanly. “friendships? Thanks to commercial imperatives, designers and programmers typically create devices whose responses make us feel better” (Christakis, 2019). As a consequence, it could have a negative effect on children’s development of empathy. On the other side, also these personal devices have in a certain moment of their use become people’s confidential tools. “Shulevitz herself says she confesses things to Google Assistant that she wouldn’t tell her husband. If we grow more comfortable talking intimately to our devices, what happens to our human marriages and friendships?” (Christakis, 2019). The users develop “feelings” towards the machines by feeling a sense of trust toward them.

The social interaction between “robots” and humans, as Christakis call them, “Hybrid systems” need to be evaluated. Computers may have a beneficial or negative effect on humans that given the time that has passed we are only beginning to see. As we saw with the example of children yelling at the human-voice devices it has raised concern. Yes, they are not humans, and they do not have feelings, they are a machine that take the orders that the human command. However, the behavior at such a young age hasn’t been evaluated yet, and we still don’t know until they grow up if there has been an effect at all. In her study about people behavior towards the digital assistant Alexis, Judith Shulevitz, states: “As AI permeates our lives, we must confront the possibility that it will stunt our emotions and inhibit deep human connections, leaving our relationships with one another less reciprocal, or shallower, or more narcissistic.” (Christakis, 2019). User design and software that interacts with the users are created to generate as much satisfaction as possible. Yet, in real life with people this barely is the case. People can be accustomed of machines that will always approve and say yes to the owners need, not having the needed feedback, as bad, as it may be from another human. Shall this generate narcissist humans? We have seen cases, such as the man in Japan that married his hologram wife; she always comforts him but is he avoiding painful truths about himself? “Both of these studies demonstrate that in what I call “hybrid systems”—where people and robots interact socially—the right kind of AI can improve the way humans relate to one another.” (Christakis, 2019). Or is this generating self-esteem and confidence to him.

## Project Scope

The future is now. Production of holograms have already begun, and they have been applied in different fields proving their utility and strong potential. The integration of Holograms into society may not be far from today. And not only their production has been broad, but their evolution comes in a period of time where the study on computer-human interaction has started in the social sciences. I believe we are in a momentum period where we have sufficient information and tools to be prepared when their incorporation arrives massively. In this case, enough information and tools to study and maximize their use according to the particular purpose of use. In this case, I would like to focus my study on holograms as a medium for advertising. My examples on research studies about the beneficial and negative effects of computer-human interaction have had, sheds light and gives ground to demonstrate how this is an already existing field of study, enough to create debate in the social sciences about a new paradigm if machines with AI should be considered social actors. Particularly contributes to the present study, as I am interested in creating a methodology that would generate prime information to consolidate a user guide for the implementation of Holograms as medium to sell products. I do believe that holograms are the future, moreover information proving how people confide more on technology than with humans can be used positively if used correctly in marketing. With a Hologram, shy people may be able to observe and take the time they want on a product they are interested without a sales person pressuring their decision which can have a negative effect on sales, with holograms people may feel more empowered to decide as they use the object to they're will and have an almost guaranteed positive feedback from the AI software.

## Research Question

I am interested in creating a theory and methodology to acquire key information for building an effective user design in Hologram advertising. To validate my previous statements, I will gather different methodologies and theories developed at the moment to support my hypothesis on how they may be more effective than human salespersons and more engaging than the mainstream media in use nowadays. Holograms have not yet been massively generated for public use, however, this may be beneficial to not annul their imperative introduction and not overexploit them, as other advertising campaigns have done through all the current channels of communication. Therefore, I will look into quantitative and qualitative methodologies applied on the study of human-computer interaction. With this I will set a setting ground on main variables to take into consideration by also evaluating them on a social context given by different theories.

## Chapter I: Literature Review

### 1. What is a Hologram?

#### 1.1 History of the Hologram

*«You cannot predict the future, but you can create it.»*  
*Dennis Gabor*

Hologram comes from the Greek word 'Holos' which means "whole" and "gramma" meaning 'message'. The concept was created in 1947 by Dennis Gabor a Hungarian engineer working on a theory to improve the resolution of the electron microscope while working for a company called British Houston. At the time, the magnetic lenses of the microscope caused blurred images when taking a picture. Therefore, trying to grasp a picture of the atomic structure, Gabor proposed a technical methodology consisting of two stages. The first stage was the "holos", it recorded all of the information of the electron. To obtain this, he would use the interference pattern (when two different wave lengths meet) of an object wave --an amplified light applied to the object-- and the reference wave -an amplified light applied to the background -, so when both lights met they would be recorded on a photographic plate. The second stage was the optical means by which this information would be subtracted from the first image by using visible light (Belendez, 2015). Therefore, the reconstruction of the hologram would be made by applying light accordingly to the wavefront until it showed the electron paths with precision. As a result, he created the physical principles of holography where the natural wave of light is used by using its interference (recording) and diffraction (reconstruction). However, for the experiment to be made, the only source of light available at the time was the standard lightbulb, therefore even if the concept seemed right, the technological advancement of the time was not enough for the procedures required. In this case, a light capable of providing a monochromatic, single point and single wavelength source ("History of Holography", 2008).

It was until the 1960's with the creation of the laser that the studies of holograms resurfaced. In a postwar contract facility in the University of Michigan, Yuri Denisyuk and Emmett Leith working inside reading radars on military image processing discovered that holograms could be constructed as 3D images. They applied the "off-axis" technique of Gabor with the laser and created the first holograms, one of a toy-train and the other a bird. Until today's date, their technique is the setting ground for the standardized equipment to create a Hologram: laser, lenses, mirrors and beam splitters.

Furthermore, in 1968 Stephen A. Benton while researching on holographic television at Polaroid Research Laboratories invented a Hologram capable of being viewed in white light by an embossing technique. This meant that colors could be seen in the transmission of the Hologram as white light is conformed by all the seven colors. His invention can be

seen on stamps of bank cards for example. Moreover, in 1972 Lloyd Cross used the white light transmission by recording 2D moving images in holographic film that when viewed with the naked eye could be seen as 3D images. Thus, based on this, the All-Union Cinema and Photographic Institute (NIFKI) in Russia created a projected hologram movie by recording with a holographic camera.

## 1.2 Meaning of the Word – Proof of engagement -Evolution of the perception of hologram in society

The form, meaning and symbolic association of the Hologram has been reshaped since the 1960s. May it be by engineers, hippies or artists, holograms have created a new category in the imagination of peoples' minds as a dream of a latent technology. As Johnston states, holograms represent "a symbol of latent potential." (2016). They represent past and future making them magic and mysterious. Not being coincidence, it has been used in science fiction movies to display future technologies for they represent an *essence* of modernity. How was the transition for the connection of humans with holograms and what previous experiences consolidated this one? How has it been understood over time (general cosmovision)? I will use Sean Johnston's article "Holograms: The story of a word and its cultural uses" to understand the cultural engagement and use of the holograms.

The first years after the creation of the Hologram its viewings where secluded to a small audience. Only engineers where allowed to see the new discovery. Therefore, the information exported from the private expositions depended heavily on the words the engineers used to describe the new object. "Once revealed, however, the miracle of holograms proved difficult to express to a wider public" (Johnston, 2016). After the "boom" of its discovery among the scientific community, some reporters were allowed to witness private demonstrations. Nevertheless, even for them words fell short to interpret this new object and allure it in a simplistic way towards magic. "Holograms had baffling qualities that evoked the novelty of childhood experiences and the appeal of sorcery." (Johnston, 2016). As an example, from one of its core creators, Emmett Leith described it as follows:

"It was most fascinating, because here you had a piece of film that had nothing but garbage on it . . . and then you looked downstream where they came to a focus, and there you saw a real, nice, sharp image, and there was nothing producing it—there was an image but no optical elements—kind of like a grin without a cat by Lewis Carroll's analogy."

The media, trying to get a grasp on its nature and understand it, relied on the explanation and description of the new device baffling as even scientists depicted it as sorcery. As a consequence, this was the information given to the non-scientific public. "These modern crystal balls remained clouded for those without a magician's skills.". The gap between science and the public broaden, and the hologram became a mystery.

It was until the late sixties that mass exposure to the holograms finally occurred, and not by a real hologram per se, but a hoax one created in Disney World. In the Haunted House ride, spectators could see floating ghosts behind glass windows. Even though, the technique used was a Victorian trick, known as “pepper ghost”, for the first time, people saw the essence of what a hologram is. As in the 1970’s the Rolling Stone Magazine announced:

“The hologram is as likely as anything technological to push your subliminal awe and wonder button and leave an ancient message flashing somewhere below the surface of consciousness: Here we have some Powerful Magic”.

Hence, the magic and science combined successfully.

Holograms as an inventive novelty gave faith to the advancing products of technology. As the popular understanding of the hologram expanded it permeated culturally on its different applications. Besides, lasers, the light from which holograms are created were also massively exposed. Lasers also had a social impact by it was new and could be used in small gadgets by ordinary people and seen as modern technology in science fiction/action movies such as in James Bond. In fact, the report on the laboratory where Holograms were created was called “Death Ray Laboratory”, based on the movie. Accordingly, the 1930s depiction of the crazy scientist laboratory that depended on electricity transformed into the crazy scientist filled with laser machines and Avant-guard never before seen science. Media representations of mid-century labs transmuted lasers and holograms into new stereotypical forms that combined the dedication and secrecy of an alchemist with the powers of a magician but were devoted to inventing the future.” (Johnston, 2016). The cultural imagination transitioned from one stereotype to another, consolidating holograms as proof of its mass exposure.

The arts proved to be the medium for the public to engage with the new scientific invention. It was thanks to artists and the entertainment industry that the public had the opportunity to meet this new potential reality in person. The dependent descriptions of engineers and reporters were pushed aside to prove its awe in person, not as a necessarily magical object but recognizing its scientific background. Getting audience closer to the Holograms allowed society to feel more engaged towards science and recognize its part in the process of its consolidation. “As opportunities to witness holograms grew, popular understanding evolved to fit [the] narrative of consumer benefits.” (Johnston, 2016). Though, as other technologies had been rapidly evolving, holograms were made to believe by companies that as easily and fast as other technologies had evolved this one too would have the same pace. Even *Life* magazine published an article on the certainty that in 15 years from the date, televisions would project 3D images. However, intentionally not true, these actions finalized the permeability of holograms to an audience that unless they belonged to the privileged sphere had to depend on the description published by the media. This way, holograms had their own culture appropriation by obtaining popular interest. “Hinting at both magicians’ tricks and reassuringly familiar technologies, growing audiences suggested a

cultural place --and a consumer future-- for holograms.” (Johnston, 2016). As a result, holograms were democratized and its meaning multiplied through decades.

Holograms at the beginning were described by written text. Be it scientific papers, magazines or science fiction books. A second wave of interpretation came in the 1980s as those written pieces were given life in the film and television industry. “Contemporary cinema, television and video games illustrated what the fiction writers had described.” (Johnston, 2016). A second perception consequently was created giving a new meaning to the word. Additionally, in the 1990s the internet and videogames reinforced the immersion of its use by passing from seeing it on a screen to actually interacting with it through the screen. This being said, through videogames players “used” and watched hoax holograms. “Owing to the enculturation provided by video games and the wildfire mutation of online information, this compelling mixture of mystery and high technology has become a democratic art: Mass audiences play a role in actively constructing the cultural identity of holograms.” (Johnston, 2016). As Johnson states, videogames added additional attributes to holograms by allowing immersive fantasies to happen, as well as becoming part of a new cultural life. Now, there is no mediated representations of Holograms, i.e. written newspapers or movies, but people can have a semi-direct experience with it. And as a result, with the historic background, of the notion and perception of the hologram, this device has proved to be a concept of modern sorcery and technical wonder. “The greatest impact of holograms, consequently, has been in our minds. Holograms have had their most enduring influence as an expression of the magical and as a metaphor for the future.”. Thus, the entertainment industry has been key to broaden the cultural meaning of the word, associating it with enjoyment, amusement and excitement.

### 1.3 Holography in Media-

Holography is a replica of a real object made of light. It is a visual simulation with the same visual properties of an object but without its material properties. It is intangible. Currently, the media, understood as “the main means of mass communication (broadcasting, publishing and the Internet)” (Oxford Dictionary, 2020), uses bi-dimensional images onto a flat support. Thereby, the medium used may vary, but due to its same morphological characteristics, images can be easily transferable. For example, an image shown in television can be shown as a picture on paper. Whereas holograms, can be displayed only by its required medium or their uniqueness would be annulled, meaning it cannot have the same transferability feature with the current media. Consequently, now that holograms are starting to be introduced in the media, it needs new displays, new visual media, and new genres of communication (Capucci, 2011). The meaning of ‘image’ changes now that matter and energy create a dichotomy on its creation. As Capucci states, we live in a perspective-based culture, where the images we see are represented as three dimensional in bi-dimensional spaces, depending entirely on the Renaissance perspective; the 3D effect comes from the visualization technique of the “point of view” in space, making it a subjective element. “By moving in front of a hologram, unlike perspective-based images, we acquire, instead of loose, information

(...)” (Capucci, 2011). Therefore, Holography gives more freedom to the observer: in front of a hologram we can choose the viewpoint and spatial position of the image, as we can with a real material object.

Amplifying, in the media realm, bi-dimensional images have a coherent way of transfer and conversion. A printed picture of an advertising ad can be digitalized to a computer screen, a movie or a TV screen, or be replicated on any surface. On the other hand, on cinema and television the filmmaker’s eye and perception is vital to the information given to the public. “Consequently, commercial spots, music video clips and action films can reach the human physiological limit in the perception of rapid image changes.” (Capucci, 2011). The difference between cinema and the printed media is the movement of the bi-dimensional images, meaning to the human visual system an unsteady visual focalization. Hence, on films the information given is dependent on the viewers’ attention (Capucci, 2011), and that limits the information given as also the camera lenses can only take a portion of an object or scene. As we suppose holograms will enable the viewer the opportunity to interact with an object, the visual attention adds a new element, which is time. Now the medium behaves according to the will of the user. If for example, a hologram of a shoe is displayed “since it does not lie on a flat screen, our visual system must focus on many parts of it from different distances in order to catch the image. Despite the fast visual” (Capucci, 2011). Focusing on “real” objects takes more time as the acquisition of information depends on seeing all of its sides. Moreover, this new variable of time, transfers to films with even a more distinctive nature, that it is its dynamic. Fast track movies, as we are used to, would not fit in holographic movies. As we have seen, Holograms, cannot integrate to the present mediascape, consequently there needs to be created new displays and visual media for it, perhaps hybridizing with the current ones, but certainly needing to be applied differently.

#### 1.4 Social response to smart phone - Method 1 - Computers are Social Actors Paradigm

The Department of Telecommunication of the University of Florida has led a laboratory experiment using between-subjects factorial to evaluate how mobile phones not only function as intermediates to communicate people in two different locations but have also gained agency in society. The experiment “Language modality, and mobile use experiences: Social responses to smartphones cues in a task-oriented context” led by Kun Xu applies the theoretical framework of “Computers are Social Actors” paradigm to explore the social interactivity the users have towards these devices. “(..) researchers have pointed out that mobile phones are not only acting as intermediaries that connect users from different places, but also communication terminals that present different combinations of social cues.” (Xu, 2020). Therefore, cell phones do not only comply with technical purposes but have become companions for the users. “understanding how users perceive, evaluate, and interact with them would help researchers anatomize the relationships between humans and technologies in the current digital age” (Xu, 2020). Through the CASA paradigm, the experiment gives support of the new theory and

expands its use, as to more research is needed to understand how technological devices are perceived as social agents rather than mere machines.

The researcher aimed to prove how the use of mobile media by the individuals create an effect in the social dimension of the users and in their psychological responses. “Nardi et al. (2000) found that instant messaging via mobile phones not only facilitated information exchange, but also shaped an outer action process where users negotiate” (Xu, 2020). This is, how a smartphone device can be perceived as a social entity. Xu used the categories by Nass (2004) to determine the user social responses to computer technologies: Language use, human and synthetic voice, face, emotion, interactivity and social roles. Therefore, the researcher evaluated the language and modality cue; participants were exposed to a smartphone with two type of voices, anthropomorphic and non-anthropomorphic with formal and unformal language. “A social cue is a type of indirect communication that informs or guides our interactions with others. These include certain facial expressions like a furrowed brow or a smile, both of which are indicators telling you how to proceed in the interaction.” (White, 2020). In the context of this experiment, language and the modality used on the mobile phones were the communication terminals for social cues.

Understanding how users perceive, evaluate and interact with mobile devices support the new studies on the relation between humans and technologies in the current digital age. The methodology used was as follows: 100 student participants were recruited, half male and half female. Due to the location where the recruitment was held, there was only one category of age giving an average age of 20 years old. Next, they were asked the total number of hours of use of their mobile phones. Following, the participants were given a riddle to solve with the help of a cellphone app that guided them with hints through text or voice- anthropomorphic and non-anthropomorphic-. For randomly assigning which type of smartphone the participants would receive, A 2 x 2 between subject factorial was designed so the participants could have an anthropomorphic voice, non-anthropomorphic voice, text with anthropomorphic language and text with non-anthropomorphic language. After the participants completed the first task, they were asked to answer Likert-type scale questionnaires. The questions revolved around their feelings and perception towards the smartphone device after they finished the riddle game. In total there where 7 questions that acquired the following information as stated exactly by Xu (2020): “

- Social presence: Participants were asked to report their feelings on a Likert-type scale with seven 10-point items (1 = not at all, 10 = very much). The items include “How much did you feel as if the mobile phone was talking to you?” and “How much did you feel as if you and the mobile phone were communicating with each other?”
- Perceived social attraction: Participants were asked to report disagreement or agreement on a 10-point Likert-type scale with four items (1 = strongly disagree, 10 = strongly agree). The items include “I think I could establish a personal relationship with the mobile phone” and “I think I could have a good time with the mobile phone.”

- Perceived trustworthiness: Participants were asked how they felt about the phone on four items. The four items use a 10-point semantic-differential scale. Examples of these items include “Untrustworthy - trustworthy” and “unreliable – reliable.”
- Conformity intention: Participants were asked to report on seven 10-point Likert-type items (1 = strongly disagree, 10 = strongly agree). Examples of the items include “I was willing to follow the opinions from the mobile phone” and “I was dependent on the mobile phone’s advice.”
- Actual conformity: Measures of behavioral change, was measured by calculating the percentage of the number of changes that the participants made to match the suggestions from the phone and the number of the inconsistencies between the participants’ initial choices and the suggestions from the mobile phone. The percentage was converted to a 10-point system.
- Mobile media usage: Participants were asked to indicate how many hours they spent using their mobile phone on a typical day and how many hours they spent using their electronic tablets on a typical day. Responses to the measure were summed and averaged.
- Intensive phone use: Participants were asked to report on a seven-point Likert-type scale with three items (1 = strongly disagree, 7=strongly agree). Examples of the items include “I make good use of most of the features available in my mobile media device” and “I use my mobile media device intensively.” “

The results from the investigation gave some light towards why the participants are attracted to smartphones and understand the role the devices play in our daily life. “While users may maintain social relationships with others through phones, they can also form social connection with phones per se” (Xu, 2020). The results from the experiment did not show a significant difference of effect between using voice or text through the smartphone, however it did encounter enough valid information to illustrate how users that spent more time using smartphones where less affected by anthropomorphic voice and polite language. Actually, it was the other way around, and participants preferred the device’s own “tech” voice without a personal input. On the other hand, the participants that tended to spend less time using smartphones did prefer kinder language with anthropomorphic voice. As a result, the experiment proved how smartphones do have social cues. Nonetheless, the experiment did not take into consideration “individual differences, and communication contexts that contributes to people’s social reactions to the smartphones.” (Xu, 2020). Therefore, these previous elements need to be applied in further researches as social cues, individual factors and communication contexts lead the perception that people have on media -smartphones- as social actors. “research could concentrate on when and why such responses occur (Nass and Moon, 2000), especially

what the combinations are that facilitate or inhibit users' attitudinal and behavioral responses to media technologies." (Xu, 2020). Lastly, the methodology described can be used to inform a user interface design, as both the language and modality cue have proven to be elements needed in the design as on both Google's Material Design guidelines (2017) and Apple's iOS Human Interface guidelines (2017) have acknowledged the importance of human-centered language in designing voice-based information.

## 1.5 Gratification - Consumer Engagement (U&GT)

- Method 2

-Uses and gratification theory

Phillip A. Rauschnabel research article "Virtually Enhancing the real world with Holograms: An exploration of expected gratifications of using augmented reality smart glasses" of 2018 explores how augmented reality devices enhance the perceptions of reality. The study proposes a theoretical model to examine the reasons behind people's intention on using smart glasses (ARSG), this is, their expected gratifications from their use. "Understanding ARSGs is particularly important theoretically because, for most people, they are an entirely novel technology, rather than just an extension of an existing stream of media devices" (Rauschnabel, 2016). How can people benefit from altering their real world? And what type of value does ARSG give to people, is it to be entertained, for work or to socialize? Also, apart from the content gratification is it for a process gratification? Meaning is gratification caused by being seen using them? Based on the Uses and Gratification Theory (U&GT) Rauschnabel addresses these questions to identify what type of content the users are looking for and if these motivations vary according to the context.

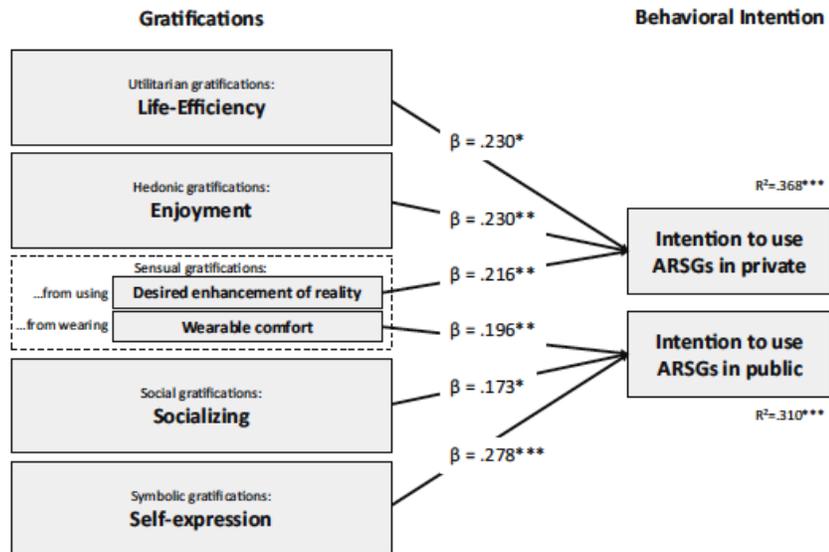
Under the communication science field, U&GT analyzes why people use specific media assuming that these devices are not imposed as in mass-media but are chosen by the subject's individual needs and motivations. "According to U&GT, people tend to be motivated to fulfill unsatisfied needs by using particular media." (Rauschnabel, 2016). Therefore, the gratifications people seek by using the media is from expected gains after their use. The author creates a framework of three utilitarian gratifications: sensual, social and symbolic and within them five categories: 1) Cognitive needs (i.e. information gathering); 2) Tension-release needs (i.e. diversion); 3) Affective needs (i.e. emotional experiences); 4) Social integrative needs; 5) Personal integrative needs (i.e. confidence building). Adding a difference in all the categories if they were received in private or in public.

To obtain the information from what type of gratifications users feel when using ARSG, the research design was held via an online survey at a university. "Using student samples to understand new technologies is an established procedure (Ono, Nakamura, Okuno, & Sumikawa, 2012), especially because such homogeneity might increase internal validity and because students are often one early adopters of new technologies." (Rauschnabel, 2016). Prior research has proven that student samples do not lead to biased conclusions.

The total amount of participants where 228 students, half female and half male. Following, before the survey started students read a short description on the general idea of smart glasses and watched a commercial video of one. Then, the participants answered if they felt recognized with the following affirmations on each category:

1. *Life Efficiency*: To obtain content gratification people believe the ARSG help them do certain daily task with more efficiency.
2. *Tension Release*: ARSG have high hedonic value linking it to a multisensory, fantasy and emotional consumption leading to pleasure and reduction of boredom.
3. *Affective needs and desire of enhancement of reality*: ARSG changes the visual and touch senses engaging the users in other realities like as in another world in a private context (private because they are the only ones able to see the virtual objects).
4. *Wearable comfort*: ARSG share a psychological similarity as in fashion, where they are a statement in both private and public context.
5. *Social integration*: ARSG may help people to socialize more, via inner media communications within the glasses or as a starter conversation.
6. *Self-expression*: The intention of use is in a public context as way for people to present themselves.

The research filled in the gap of the U&GT framework concerning the consumers reactions to ARSGs by identifying and testing six gratifications of ARSGs and their effects on the intention of use. “we compared the AVE from each construct pair with its squared factor inter-correlation. The AVE for each of the related constructs was substantially below the squared correlation, providing sufficient discriminant validity” (Rauschnabel, 2016).



**FIGURE 3** Results  
 Note: ARSG = augmented reality smart glasses.  
 \*\*\* $p \leq .001$ ; \*\* $p \leq .01$ ; \* $p \leq .05$ .

### Figure 1. Raushnabel Results

The results confirmed the utilitarian, hedonic, social and symbolic needs are the base for ARSGs intention of use. The statistic information collected showed each category correlation with each need: life efficiency-utilitarian; hedonic-enjoyment; sensual-desire of enhancement of reality and wearable comfort; socializing-social; self-expression-symbolic. However, there was no significance for wearable comfort and socializing in private. The findings of the study provide a valuable source of information as to not to rely only on one category, usually only the utilitarian, but to rely also on the hedonic and the symbolic to better understand the intentions of use. This specially can apply for the marketing campaigns to have a greater level of impact knowing the audience they are after, for hedonic, utilitarian or for social reasons for example.

Furthermore, the experiment has to take into consideration aspects that may impact the original results if replicated. One of these are the effect in different cultures. Another is the difference between having seen or used the ASRGs and answering the surveys to the questions being answered by assumptions. As well, the research could broaden its efficiency on the accurate recollection of information if applied with a mixture of qualitative research. Finally, in general, the research proved people use technology if they see a value in it.

- 1.6 Augmented Reality
- Immersive Experience
  - Interactive Marketing
  - User Generated Content

Little is known about how Augmented Reality (AR) can be applied as an innovative marketing tool. While AR can create interactive advertising “and enable consumers to experience products and spaces in novel ways.” (Scholz & Smith, 2016) there is not enough information on how to execute an effective AR advert in the market. The research “Augmented Reality: Designing immersive experiences that maximize consumer engagement” by Joachim Scholz and Andrew N. Smith address the gap creating a framework to use for reference. With this, basic design decisions can be made when planning an Augmented Reality campaign, for marketers will be able to understand the dynamic of passive and active elements and enhance multiple types of consumer engagement. Thereby, they developed eight recommendations under the acronym ENTANGLE for marketer managers to use and maximize the consumer engagement.

On the rise of emerging technologies marketers should integrate augmented reality in their marketing campaigns. However, until the designers proposed the following framework there was no building block, design principles and understanding of Augmented Reality apart from its technical qualities and non-commercial applications, as the authors say. Starting, the AR experience needs Augmented Reality content. Its components can be divided in two, active ingredients and active ingredients. Active ingredients include the AR content itself, plus the users and the virtual objects (targets). “These five ingredients—AR content, users, targets, bystanders, and background—are the building blocks required to design and optimize AR campaigns.” (Scholz & Smith, 2016). In more detail, the AR content is the virtual information perceived by consumers in digital devices or in AR devices. The users are the people experiencing the AR layer. Additionally, the targets are the physical objects that are virtually modified with the AR (i.e a living room with virtual sofas). Passive ingredients “(..) are not a direct part of an augmentation but can nevertheless profoundly influence how consumers experience and respond to market-oriented AR campaigns.” (Scholz & Smith, 2016). More precisely they are the non-participant witnesses (bystanders), non-augmented objects, and the ambient conditions (background). Bystanders are people who do not participate in the AR experience but stop to observe the user’s interaction with it and may affect the behavior of the user considering if their actions are socially appropriate. Furthermore, the background are the objects and background conditions where the AR is displayed.

Scholz and Smith (2016) propose the following steps for designing an AR experience:

- 1) Define audience and campaign goal;
- 2) Determine how users will trigger the AR layer.;
- 3) Regulate how and whom the AR layer will be furnished with targets;
- 4) Establish how the AR layer will integrate in the social and physical context.

Marketers should first formulate a campaign goal based on their target audience and communication goals. “Do they want to create awareness for a new product, convey product knowledge, create emotional experiences, or cultivate communities and relationships?” (Shcolz & Smith, 2016). Moreover, the marketers need to decide in what moment the AR layer is triggered by the marketers themselves (programming the device to a specific event or timing) or the users decide. “Thus, letting users trigger the AR layer themselves aligns well with the objective of conveying product knowledge.” (Shcolz & Smith, 2016). Thus, letting the marketers decide when the machine should be trigger is “useful when the communications objective is to create awareness.” (Shcolz & Smith, 2016). Secondly, with this information, take the decision on how the content will be distributed. Lastly, determine how the AR layer will be integrated with the real/physical world.

Consumer engagement is the process when a customer builds a relationship with a product after the interaction enhanced the relationship. This element is fundamental as a competitive advantage. One type of engagement is the user-brand engagement and can be delivered with AR because of its different modalities in action such as perception, manipulation and interaction. “The highest level of user-brand engagement is achieved when an AR initiative affords users the ability to interact with AR content.” (Shcolz & Smith, 2016). Furthermore, increasing the level of sociability adds to the value of AR as it develops a user-user engagement where users from the AR layer can interact with one another. “AR campaign that integrates elements of sociability deepens the linking power (Cova, 1997) of a brand, creating strong relationships that draw customers in and encourage them to return time and again.” (Shcolz & Smith, 2016). A third type of consumer engagement comes from the relationship between the users and the bystanders. “These visible records inform bystanders about an AR experience and can even stimulate bystanders to engage in the experience themselves.” (Shcolz & Smith, 2016). The word-of-mouth is highly effective as it can lead to an AR campaign go viral.

To maximize the utility of the five ingredients of Augmented Reality the authors propose an oriented-market approach considering how the AR content entangles in the physical world of the consumers. In the same way, marketers should “ENTANGLE” their initiatives to provide a unique AR program. They should consider the Experiences, Nourish the engagement, Target the audience, Align AR with marketing programs, Neutralize threats, set Goals, Leverage brand meanings, and Entice consumers. Firstly, the Augmented Reality initiatives should be based on the experience of the consumer rather than only confiding in the technology as the experience itself. “AR experiences that fail to meet or exceed consumer expectations may also impair brand image, waste resources, and imperil future programs involving AR or other emerging marketing technologies.” (Shcolz & Smith, 2016). Although, new technologies may be exciting, not in sighting how the stimulation and what content should occur might fail the whole experience process. Secondly, instead of emphasizing only on the product production (flashiest, biggest, costliest) the attention should focus on the consumer engagement as the technology provides an opportunity to manipulate the content. Thirdly, it should highly be considered users with the ability to create an additional awareness of the campaign (i.e. influencers) as target audiences due to their ability to expand the campaign by a word-of mouth wave

reaching potential consumers. Subsequently, this comes in hand with aligning the AR with the marketing program where AR provides the unique benefit to demonstrate how the product their advertising does work. Eventually, marketers need to visualize the potential threats and neutralize them, in this scenario the main threats are the response of the competition and a poorly integrated AR content (mix of the digital and physical world). In accordance, the AR experience must be aligned with the brands intended image, overall the brand “feeling” is coherent with the consumer experience, thus leveraging the brand meaning. Finally, marketers should entice the consumers to re-visit the AR experience and deliver the value that attracts consumers while also being careful of the risk of intrusion if the trigger is wrongly timed.

All things considered, the strong potential Augmented Reality has can provide unique experiences for consumers that marketing programs can have into account when designing them. As the authors state, “some marketers might follow a technology-driven approach and prematurely commit to a particular AR device.” (Shcolz & Smith, 2016). Marketers need to look beyond the technicalities of AR and develop an immersive consumer experience with the combination of the virtual and the real world. For this, they can use the proposed passive and active ingredients of AR and it’s four step recommendations while focusing at the same time on the dimensions that drive the consumer engagement on the lines of possibility of purchase, sociability in its use, and the artifacts. With these elements’ marketers can create breaking AR programs and position the consumers in delight.

### 1.7 A hologram user study -

Museum exhibitions are in high demand of cutting-edge interaction technologies. As Caggiaese et.al (2020) in “Discovering Leonardo with artificial intelligence and holograms: a user study” state exhibitions are constantly looking for ways to engage visitors and enhance cultural knowledge. Usually these exhibitions are built only using a single technology format. For visualization for example high resolution projections, for motion the use of gesture interfaces or for verbal interaction the use of chatbots. This leads to a limitation of the potential of all three forms of technology has as visitors vary widely in age and background. “The massive adoption of these novel technologies in museums has set high expectations for the user experience but finishing to led to frustrations in the visitors when they observed the absence of customizable interaction modalities depending on their profiles and interests.” (Caggianese et.al, 2020). Therefore, there are multiple profiles and interests not covered that require a multichannel interaction modality. “The goal was to assess how users of different ages and interests perceive, understand and explore cultural objects when holograms and artificial intelligence are used as instruments of knowledge and analysis.” (Caggianese et.al, 2020). The team of Caggianese et.al has proceeded to apply a user study, to evaluate a successful application using Holograms and Artificial Intelligence. The work used Leonardo Davinci art as a holographic stand placed in three different cities of Italy where people could interact with the pieces; using semi-transparent glass, the holograms could be manipulated by a touchless gesture

interface that also had a conversational interface for the dialogue in context with the questions in conversation and interaction.

To further explain how the exhibition functions a brief description of each module is next. The system is based on four modules, gesture, visualization, conversational and attentional. The gesture model uses a Leap Motion sensor and a map visitor to gain the data for the hand gestures into the system interactions. Accordingly, when it is activated the hand movement is detected and a virtual reproduction of the user's hand is shown as a guide. Obtaining this information, the user can choose the model shown on the screen, being able to rotate and zoom the selected model. Secondly, the visualization module with the feedback from the gesture model manipulates the virtual objects. As well, it also backs on the conversational module to match the visualization asked by the user. Thirdly, the conversational module manages the users input speech, evaluating the intent of the words use, establishes a natural language for the user to understand, extracts the information from a data base and asks for missing information in case it is hardly inferable. All this to give information to the visualization module and enable the multimodal connection and interaction. Lastly, the attentional module was used for the system to differentiate when the user is talking directly to the machine or to a third party, like a friend. The module was able to detect when the user looked at the holographic projection or not and activated the conversational module consequently.

The chart below summarizes and illustrates the procedure:

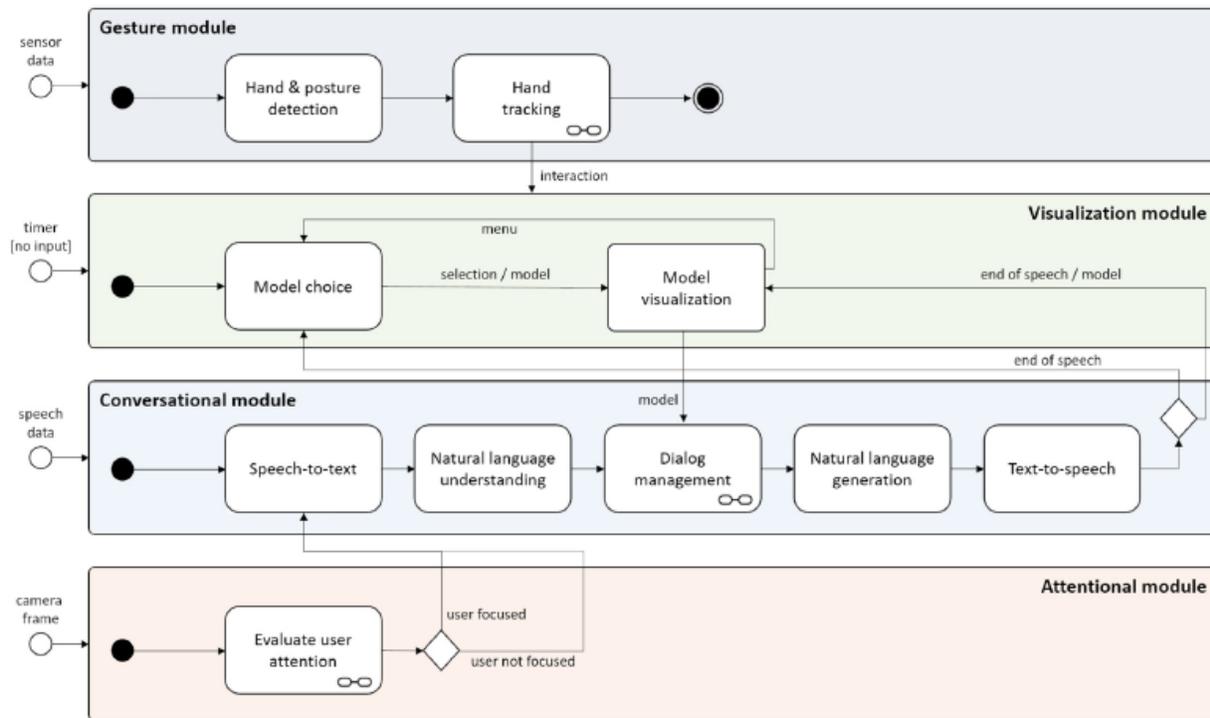


Fig. 2. The main system modules and their connections.

Figure 2. Function Modules of Leonardo's hologram Stand

To assess if there was a difference on preferences between a technology exhibition or an art exhibition and of how different the value of interest is to the holographic stand between visitors of different ages, the authors measured the information according to the number of questions made, the number of models selected and how much gesture interaction occurred. For this, the authors used a between groups factorial design to analyze each independent variable separately. In the experiment scenario, the two factorial design was based on two independent variables, young/adult and art/technology. Regarding the subject's approach to the holographic stand, the data collected was measured in time of interaction selecting the models and interacting with them. On the other hand, it also took into consideration the number of questions and if it was meant for the hologram itself or to ask about Leonardo da Vinci's work of art.

Additionally, the dependent variables were: Session time, Selection time -for time spent selecting a model-, Interaction time -for time spent rotating or zooming in a model-, Selection Count – for the number of models selected to observe-, Question count – total number of questions-, Assistant question count – number of questions asked to the AI-, and Cultural question count -number of questions towards the art itself- which also includes inside itself a Description question count -general descriptive questions- and Deepening question count. With respect to the population selected, all where visitors of the museums and their ages where categorized in four groups as well as the exhibition type they preferred (technology or art). As well, the visitors selected had to interact with the interactive stand minimum 30 seconds.

The information gathered revealed an equal time spent in each group age category. In more detail however, the time spent selecting the model, asking questions and listening to answers, manipulating the models and/or looking at the models did have significant differences. "On average, the young subjects spent more time selecting the models, and generally the Selection time is higher during artistic exhibitions" (Caggianese et.al, 2020). According to the data, the selection of technological models decreased as the ages increased. Nevertheless, young users' behavior was almost the same in both exhibitions, tending a few points higher towards the technology. Regarding the number of questions asked, more questions where made in the art exhibitions. "(...) moving from art to tech exhibitions, the number of deepening questions slightly increased with young subjects but strongly decreased with adult users." (Caggianese et.al, 2020). Adding, to the type of questions asked the young subjects tended to have more questions than adults and on technology even in both exhibitions, as in the art exhibitions they could ask about the machine drawn or how it supposedly worked.

The hologram experiment in the cities of Milan, Genoa and Naples "enabled different interaction channels in the exploration of cultural contents". (Caggianese et.al, 2020). Since, the number of people that visit a museum is high it is parallel to the variety of tastes and likes, summing the age. The hologram proved to be an effective mechanism that combines a conversational system and a touchless interface. As shown in the results, the age made significant difference in the number and time of questions, even if in both groups, young and adult, the average time of spectating was similar. As a result, "The results have implications for the design of advanced applications for CH when different

types of user are expected to interact with cultural contents.” (Caggianese et.al, 2020). The relation between the modalities to explore a cultural content according to use and interest can have a further research.

## 1.8 Effectiveness of a Hologram Ad in Malaysia

There is a high need in the marketing communications media to change the traditional methods used. Ramlie et.al in Malaysia has conducted a study for advertising on the development of the use of holograms as a new medium to analyze its efficiency on message delivery. “According to Schaefer, new methods of advertising are emerging in the digital era that is reshaping the traditional world of advertising, and to stay on top of the game, marketers need to be able to utilize these new methods” (Ramlie et.al, 2016). A fresh new advertising for selling products is needed as costumers are becoming immune to the standard marketing methods. As a result, advertising needs to keep up with the economy and social game and align with the emergent technologies. Thus, holograms may be a new alternative for advertising, enhancing new current technologies.

The authors categorize the mediums for advertising as each has its own marketing strategy to approach a specific target audience. Above the line (ATL), Below the line (BTL), and Through the line (TTL). They focus on ATL, which is the advertising through conventional means such as television, cinema, radio, and print that can be seen in or out of people’s homes. It is mostly used when the target is not well defined, so it fits in large audiences, considered impersonal to the consumers. Ambient advertising is part of ATL and uses New Media as a method for advertising using advanced technology through the digital screen called Digital Out of Home (DOOH). “This DOOH is a form of out-of-home advertising is a medium that replaced the printing medium that used digital signage to display the messages to specific locations and consumers at specific times” (Ramlie et.al, 2016). The Ambient term is used for outdoor campaigns as there is a challenge for the conventional strategy of advertising as consumers are looking for something different and unusual to capture their attention. “This encourages the client to see something different advertising agencies put in place an unusual, like on the floor, petrol pump handles and backs the toilet door -Previously not considered as a location for advertising.” (Ramlie et.al, 2016). Thus, consumers are ready to be on the lookout of “surprising” new ads.

The hologram was installed in the busiest street of Kuala Lumpur in Bukit Bintang Street on peak hour between 20:00-22:00. There were two methodologies applied. A qualitative method was made by recording in video the reaction of people passing by as well as to have in record any additional information a passerby stated while and after observing the installation. “method, suggestions or opinions are taken and been recorded as to be taken into account for further improvements to be made. Information obtained by first impression of the consumers will be useful for future use later on.” (Ramlie et.al, 2016). The second was a quantitative methodology delivering short surveys to passerby’s that agreed to fill them. Following the questions asked in the survey and its results:

**Figure 2.**  
Demographic information.

*Table 1: Analysis of Demographic Study*

		<b>N</b>	<b>%</b>
<b>Gender</b>	Male	55	55
	Female	45	45
	<b>Total</b>	<b>100</b>	<b>100</b>
<b>Age</b>	18-25	30	30
	26-35	50	50
	36-50	20	20
	<b>Total</b>	<b>100</b>	<b>100</b>

**Figure 3.**  
Answers towards the holograms as  
a new medium for advertising and  
memory of the ad.

*Table 3: Respondent opinion*

		<b>N</b>	<b>%</b>
<b>Respondent opinion, whether is it suitable as a new advertising medium.</b>	Agree	98	98
	Disagree	2	2
	<b>Total</b>	<b>100</b>	<b>100</b>
<b>Respondent recall the advertising and message</b>	Recall	80	80
	Can't recall	5	5
	Half-remembered	15	15
	<b>Total</b>	<b>100</b>	<b>100</b>

Table 2: Respondent feedback about 3d Hologram medium

		N	%
<b>Respondent has seen a medium (3D hologram)</b>	Yes	25	25
	No	75	75
	<b>Total</b>	<b>100</b>	<b>100</b>
<b>Respondent has ever seen a medium (3D hologram)</b>	Online	20	5
	Magazine	1	0.25
	Television / Movie	4	1
	Live	0	0
	<b>Total</b>	<b>25</b>	<b>25</b>
<b>Respondent attracted to the medium</b>	Very Impressed	65	65
	Usual	10	10
	Yes	25	25
	No	0	0
	<b>Total</b>	<b>100</b>	<b>100</b>
<b>Respondent views on the medium.</b>	Very Attractive	55	55
	Attractive	35	35
	Average	10	10
	No	0	0
	<b>Total</b>	<b>100</b>	<b>100</b>

Figure 4.  
Feedback on the installment and history of use

The selection of the participants was done by a qualitative method of observation according to the reaction of the holographic display. This made the selection process random. The results showed an almost equally half proportion of female and male participants. As it can be seen it took a demographic recollection to further ask about the installment itself. The majority were between 26-35 years old, next to 18-25 years old and the smaller number of participants were between 36-50 years old. The majority of the respondents, 65% were very impressed to the hologram as a medium and 10% stated it was a usual medium. Moreover, 98% of the respondents agreed the holograms are a new advertising medium, however 15% half-remembered the whole advertising message. In general, with 98% agreeing, they approached the installment because of its 3D holographic nature.

Taking this data into consideration, the research confirmed a qualitative and quantitative methodology can be applied to understand the effect holograms have as a new medium of advertisement. As well, the location is important for performing this type of experiments but most importantly, real life advertising has to consider the selection of the spatial location. "A great impact and positive results obtained from the community with the existence of this new medium of advertising in order to increase the effectiveness of delivering the messages." (Ramlie et.al, 2016). As well, the low-cost holographic

installation proved its effectiveness being able to attract a high number of participants that stopped to watch by an average of 100 per hour. Ultimately, new researches need to broaden the visual content and product.

## Chapter II: Research Design

The present academic research aims to set ground to a first user guide methodology for implementing a Holographic Advertising campaign. Considering the literature review, I will combine and apply the theories and experiments employed. This way, the proposed methodology will include a theoretical background from which to hold an empiric application. Thus, this is only a draft proposition to be applied and therefore stands as a theory method. Moreover, the following research objective is to close the research gap by creating a strategy for the implementation of an advertising campaign using a Hologram. With the methodology, marketers can apply it and obtain effective results for a disruptive advertising campaign. Consequently, as follows the proposed methodology.

Why use holograms? Noor (2016) provided multiple examples on the different uses HoloLens's have been given. Each year, more technological companies are investing part of their budget in developing Augmented Reality features. For this, companies are reaching out to new sociological theories on how their approach towards the development of their features should be deployed. In presence of the current digital revolution, a new paradigm is being discussed, where computers and they're artificial intelligence are subject of analysis, not only on their effect and impact on human behavior, but them as part of the social structure itself; computers are social actors. Understanding the hybrid system nowadays we are living in where humans are interacting with "robots" makes it necessary, as we little we know about how people perceive and interpret them (Christakis, 2019). Therefore, knowing how holographic media is starting to have a strong foot on the market, it is certain that the future --different from the far scientific future since its discovery-- is coming. Johnston (2016) described the historic process of the integration of the holograms in society's minds. From the time when it was created, audiences have had a grasp about its possibility and has led to multiple interpretations and imagination.

The hologram is, as the author say, a metaphor of a technological hope society believes will exist in a latent future. Too due to its mystic functionality, has an essence of magic and sorcery that enables a powerful awe effect. Additionally, people have already had a type of interaction with it, be it through the peppers ghost effect in amusement parks or through the use of videogames where users play to interact with it (Capucci, 2011). As well. They have seen it in movies reinforcing their latent potential of existence. Thus, understating how people perceive a technological device, for one nourishes and abides to the Computers are social actors' paradigm, and two in the specific case scenario, provides for the first time an insight on the psychological effects Holograms have on humans and use this information to implement a coherent advertising campaign. This in line of how alliances between new technologies and brands have become. Therefore,

there has to be a margin of on only the technology itself instead of acknowledging the user and its content.

The proposed experiment suggested is as follows. There will be an implementation of a holographic installation similar to the ones performed by Cagianese et.al (2020) and Ramlie et.al (2016). Regarding Cagianese et.al (2020) it shall be installed with the same modules: gesture, conversational and visualizing. Additionally, following Ramlie et.al (2016) it will be located in a busy part of the city. However, considering Scholz (2016) evidence on how a sample of university students can be an effective recollection of data, the installment would be located on a busy hallway of a university campus. Following, the first stage of the experiment would be the recollection of data from the interaction's users have with the installation, as in Leonardo's holographic exhibition. Here the data will be both quantitative and qualitative as it exists a possibility of quantifying the human behavior while observing the interaction in a non-obstructive methodology that could give more insights on the quantifiable data and the correlations found (Both Caggianese et.al and Ramlie et. al affirmed and performed this mix). Moreover, the second stage would be proceeded after the interaction with the holographic piece, where users would be asked directly to answer a questionnaire structured in conformity to the questions made by Caggianese et.al, Ramlie et.al, Xu and Rauschnabel. As a result, there will be two global independent variables, age and sex. These variables are demographic, and their "existence" is not dependable on outside factors. On the other hand, the dependent variables (in general, I will go in more detail afterwards), will be time, number of questions, agree and disagree statements, and scalable liker-type answers. With respect of the analysis of the results, they would be analyzed based on a two-factorial design; from here, linked to the categories of consumption by Rauschnabel (2016).

The first step for the proposed methodology is based on the execution of Cagianese et. al Holographic stand in different museums to study users. It would be closely implemented in reference to how the researchers followed. However, differences will be applied. For instance, there will be no categorization between the two different type of exhibitions and there will not be more than one model to observe. In instance, the show cased holographic piece would be a single object where users could interact with it using the same modules Cagliaense et. al implemented: gesture, conversational and visualizing. As a result, users will be able to zoom in and out of the holographic piece while using hand gestures and ask descriptive questions to the computer interface. Furthermore, a social science bystander will be next to the installation to help in case users have questions on how to use the installations, but also to record additional questions not considered and commentaries about it that could have a positive feedback to understand the results from the questionnaires and the interaction itself. Hence, the requirement of a social scientist comes from a qualitative method of observation that could also give insights about people's behavior relating to the stand. And this, being the only part of the experiment that would apply a qualitative research, an ethnography.

Continuing, the independent variables are the demographic information of the sample: age and sex. To measure the behavior of the interaction of the students with the holographic installation three variables are to be constructed. First, time. This is the first

variable in the time category where it would be recorded the *total session time* a user spent with the holographic stand, be it interacting, staring and/or asking. Second, the *interaction time* the user had with the virtual object, rotating it and zooming in and out of it. And third, *the number of questions* asked to the interface.

Subsequently, after the user has finished its session with the holographic piece, the second stage would start. In accordance, the user would be asked to answer a questionnaire that sums the questions proposed by Xu (2020), Ramlie (2016), and Rauschnabel (2016). This would be the combination of liker-type scales, agree and disagree questions and affirmative or negative questions. Please note, some questions were modified to adapt to the current case study and others were completely annulled and will be clarified in the next discussion chapter.

Following a draft of the questionnaire taking as reference the theories and experiments reviewed:

Taken from Xu's (2020) Liker-type scale:

- How much did you feel as if the holographic piece was talking to you?

Answer: Scale from 1 to 10:

- 1= not at all
- 10= very much

- How much did you feel as if you and the holographic piece were communicating with each other?

Answer: Scale from 1 to 10:

- 1= not at all
- 10= very much

- I think I can establish a personal relationship with the holographic piece

Answer: Scale from 1 to 10:

- 1= strongly disagree
- 10= strongly agree

- I had a good time with the holographic piece

Answer: Scale from 1 to 10:

- 1= strongly disagree
- 10= strongly agree

- Did you feel towards it:

- Untrustworthy
- Trustworthy

- Unreliable
  - Reliable
- 
- I was willing to follow the opinions from the holographic piece
    - Answer: Scale from 1 to 10:
      - 1= strongly disagree
      - 10= strongly agree
- 
- I was dependent on the opinions from the holographic piece
    - Answer: Scale from 1 to 10:
      - 1= strongly disagree
      - 10= strongly agree

Taken from Rauschnabel (2016) gratification hypothesis:

- Do you think the hologram can help you in life daily tasks?
  - Answer: yes or no
  
- Did you feel the hologram helped you to not be bored?
  - Answer: yes or no
  
- Did you perceive a change in your normal perception of the world?
  - Answer: yes or no
  
- Do you think the device would help you to decide more privately as a self-expression?
  - Answer: yes or no

Taken from Ramlie et.al (2016) questionnaire:

- Do you believe the holographic piece is suitable as a new advertising medium?
  - Answer: Agree or disagree

- Do you remember what the hologram goal was?

Answer:

- Recall
- Can't recall
- Half-remembered

- Have you seen a hologram before in real life?

Answer: yes or no

- How attracted to the holographic piece were you?

Answer:

- Very Impressed
- Usual

Here a summary table of the variables:

Independent Variables	Dependent Variables
<ul style="list-style-type: none"> <li>• Age</li> <li>• Sex</li> </ul>	<ul style="list-style-type: none"> <li>• Total Session time</li> <li>• Total time of interaction</li> <li>• Number of questions</li> <li>• Social presence</li> <li>• Perceived social presence</li> <li>• Perceived trustworthiness</li> <li>• Conformity intention</li> <li>• Actual conformity</li> <li>• Yes answer</li> <li>• No answer</li> <li>• Agree answer</li> <li>• Disagree answer</li> </ul>

With the information gathered, a two factorial design will be applied to assess what correlations could be found. Afterwards, with the results, the information will be analyzed to fit into Rauschnabel categories of:

- Cognitive needs
- Tension-release needs
- Personal integrative needs
- Affective needs
- Social Integrative needs
- Personal Integrative needs

Thus, the category Social Integrative needs will not be applied in the present experiment.

### Chapter III: Discussion

Some questions were modified in order to be adapted to the experiment. Specially, eliminated and modified where the questions applied by Xu. These questions were from the *Social Integration*, *Self-expression* and *Wearable comfort*. As Xu's research was performed in order to understand the relation between humans and smartphones, these technologies include a high degree of socialization that holograms - in the present case scenario- does not apply to since they are to be used in the street by a mass public and not for private use. Moreover, as self-expression and wearable comfort are closely related to socialization they do not apply in this research since a symbolic statement for its use is annulled as consumers do not carry the holograms with them or a device that reproduces them. In regards of the modifications made, the questions taken from his study were exactly reproduced for the present theoretical methodology thus the word "smartphone" was changed to "hologram". Additionally, the questions that inquired "how much did you feel the hologram was talking to you", "how much trust do you have to the machine" and "how much trust it [you] had on its response" are based on the conversation module of the installation.

Furthermore, Rauschnabel questionnaires were done online. The questions were placed out in a context where students would assume their relationship with a hologram. Thus, how I adapted the questions are based on a direct interaction with a holographic piece – no assumptions on how the user will feel-. As well, in regards of the chosen sample, students, the author proved a strong evidence as to how it can be used as a fast and reliable source. Students, because of their almost homogenous age and rather similar academic backgrounds help in the research as the risks of increasing the deviation standard reduces. Lastly, in comparison with not taking Xu's self-expression question, in Rauschnabel case I did, given that the holographic piece is a one to one interaction,

meaning the user is free to use it as she/he desires, and that would be one of the bases for self-expression.

Furthermore, it has to be evaluated how much information the sex variable gives. In this regard, the social context has to be taken into consideration. Sex social, economic and thus cultural difference may have a significant effect according to the location where the holographic installation will be built. In the research projects analyzed, the demographic information appears merely as a mention. Yes, all the researches managed and tried to have an equally distribution of both males and females. However, the need or the application of this information was not given. As a hypothesis, it could be that all of the studies were done primarily in strong technological countries in first and second world countries. Having this in mind, it is highly probable that both sexes have an almost equal level of education and access to technologies. The present research proposes to use sex as a variable and encourages to give it a thorough analysis. The technological gap by country and specially by sex in third world countries may have a significant difference considering women face more socio-economic and cultural pressures to have access to technology, such as a cellphone or a computer. Therefore, it would be possible to combine the questions made by Xu on “how much time do you spend using your cellphone” as a general guide to the amount of knowledge of technology the population has.

## Chapter IV: Expected Results and Implementation

The application of the experiment based on the research design I have proposed, could provide enough information to evaluate from the CASA paradigm<sup>1</sup> what are the social cues a stand of a Hologram can generate in humans. Thus, analyzing the human behavior and its relationship with technological devices would be used as a tool to maximize the effectiveness of a holographic advertisement. Hence, for branding, it is beneficial that consumers feel trustworthiness in the company and the product, generating loyal clients. Understanding how the holographic piece creates a trust with the users would be enhanced accordingly. Furthermore, additional from the trust towards the device, the reliability due to its nature as being non “corrupt” in the information it provides contrary to (in some cases) human selling strategies, for example a sales person description that will not abide to honesty to make sales, could give a sense of empowerment and this feeling be rewarded with a purchase. The sense of empowerment can have a double effect. First, it would encourage a comfort for spending more time and inquire thoroughly the product. Second, and in close connection to the first one, it would give a safe space to introvert consumers (as they are not approached by a third party and feel a social pressure, positive or negative). Consequently, holograms apart from having a strong potential as a new medium, has to open new genres and new channels for its implementation, perhaps, even ignoring the previous strategies of billboards and create its own disruptive medias.

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<sup>1</sup> “understanding how users perceive, evaluate, and interact with them [the computers] would help researchers anatomize the relationships between humans and technologies in the current digital age” (Xu, 2020).

For it, I suggest using Scholz and Smith (2016) theory on how to effectively implement an Augmented Reality campaign through the guide of “ENTANGLE”. Ultimately, the content should be coherent to the social cues it awakens, the message it wants to give and its logic towards the brand.

In regards of the analysis of the information gathered through the experiment. The outline guide would be Xu’s, Rauschnabel and Scholz & Smith categories. The results would be classified as an indicator of the social presence, conformity and trustworthiness (Xu, 2020) they felt while interacting with the holographic piece and holographic computer (AI). With this information, the research would lead to a further categorization where it would be distinguished based on their gratification felt through the high value points chosen in the liker-type question (1-10 points) and determine what type of gratification the users are looking for. From this, hypothesis would be created on the users expected gain from using the hologram. And from here, each hypothesis will cover if they are from a sensual, social or symbolic stand. Thus, the strategy behind combining and using the reviewed methodologies rely on the limited scope only classifying the entirety of the information in a single category have caused. In instance, taking how much pleasure technology gives due to its nature and not consider the content. As a result, it has to be considered the technology, the utility and the hedonism perceptions users felt.

Apart from the analysis methodology, based on the results from Caggianese et.al research, installing different modalities to a hologram stand broadens the number of users engaged. As multiple people have different backgrounds and interests, the use of visual, voice and gesture increase the security of a positive impact on any type of user. Moreover, all of these modalities provide a positive feedback (Xu, 2020) to the user enhancing the experience of the user. In the current proposition, considering Xu’s research on smartphones, I would suggest using a non-anthropomorphic voice, a computer voice, instead of an anthropomorphic as it has been proven how people prone to technology prefer this detail (a probability from relying more in a computer than in a human). As well, in regards of self-expression, the different modalities and a kind language would develop a sense of trustworthiness and therefore generate a sense of individualistic freedom to inspect the product.

On the other hand, with the information gathered the installment of the holographic stand would be applied guided by Rauschnabel active and passive ingredients. The technological voice is an active ingredient, the content as well. Upon Johnston’s examination of the narrative process society has created with holograms there is a strong hold from people’s mind of this particular virtual object. Consequently, it can be viewed in a positive light, as people will be encouraged to “finally” witness what they have been hearing and seeing all these years. However, it has to be carefully thought of as with some Augmented Reality examples, they have only relied on the technology itself, taking for granted that this will engage the consumer. For this reason, taking into account how the arts have been the field that has interpreted the words and applications since the beginning of its creation, they should have a strong involvement in the advertising piece. Creativity is key to keep track on people’s expectation as all of the references the

audience have had have come from the arts (it has its history on its back). Therefore, the uniqueness of holograms will be protected and enhanced.

In connection with the generation of content. Due to the 3D nature of holograms, a big advantage can be encountered as the users in order to view it have to interact (choose the viewpoint) with it or at least stop and observe it in more detail. Accordingly, the variables of total session time have to be thoroughly analyzed as it would give insight of the minimum time of interaction users are willing to have. By doing so, creatives and marketers will know how much content in how much time, they have to implement an ad. Further, some risks would need to be neutralized for the tendency in marketing to make it as shiny and loud as possible when there is a short period of time of exposure (Scholz & Smith, 2016). Hence, be coherent to the present research and apply a novel Augmented Reality experience through the arts and through new disruptive medias not evaluated yet.

As for the space installation of the hologram campaign, both Rauschnabel (2016) and Scholz & Smith (2016) state the importance of the cohesion with the purpose of the campaign. Furthermore, Ramlie et.al case study gave insight on the high rate of approval from users in busy streets. With this consideration, hologram advertisements - scientifically proven based on Ramlie et.al case study in Malaysia- can be and should be implemented in busy streets or main parts of the city where large parts of the population circulate. Also, from Capucci's affirmation of the risk of holograms of losing its uniqueness, it is required an evaluation of new medias and displays that should be created to implement at the stands (the nature of holograms permits new space locations where to implement them). Moreover, the location, a passive ingredient, correlates with another passive ingredient: the bystanders. In three case study's reviewed, the bystanders at the beginning were not included but after the experiment was executed they were integrated as part of a new variable to take into consideration, both quantitatively, qualitatively and theoretically. Thus, the location has to be chosen based on both the user and the bystanders.

With respect of the engagement, the fundamental basis to have a successful advertising campaign is the engagement. A competitive remark from holograms is their interactivity. As with Augmented Reality technologies, the interactivity element will create an immersive experience which will result in a user engagement to the brand and bystanders with the user by observing a positive feedback. Another quality is the subjective experience it has that enhances even more the immersion and reinforces the engagement. In more detail, its effects are both private and public; while the user is experiencing its own perception of reality it reaches a mass public exposure beneficial for the advertisement of the product.

Finally, while planning the design of the advertising campaign, marketers should use as reference Scholz & Smith (2016) framework of the passive and active ingredients evaluated in detail above, along with the "ENTANGLE" strategy. To not prematurely commit the campaign to only the technological parts and fail to commit with consumers, the results taken from the proposed methodology of the present academic research could be useful. Considering the holographic computing --it's interactivity-- and how it is

increasingly becoming more cognitive and predicting human behavior, marketers will face the challenge to inquire what it is that consumers are looking to gain from using a hologram. Under the CASA paradigm from which the present methodology is proposed, the result from the variables will prove and broaden the theory whilst responding to the current question. Thus, Augmented Reality is a hybrid system where the virtual and real worlds meet, it also enables to reduce the distance between the users and the interface. Conversely, the applications are becoming more intuitive for consumers, and the case studies have reflected this by its easiness of use. Still, the integration between the virtual and physical world is a critical point of value in its implementation as the integration of the content will be affected depending on the context it will be placed. Again, quoting Scholz & Smith (2016) statement: "Do they want to create awareness for a new product, convey product knowledge, create emotional experiences, or cultivate communities and relationships?". True, the nature of the hologram enhances the perception of reality, nevertheless in the decision process it has to be assessed how the layer between virtual and physical contexts will be established; given the time and content variables this would be resolved.

To summarize the "ENTANGLE" recommendations, a small guideline:

- 1) Define audience and campaign goal;
- 2) Determine how users will trigger the AR layer.;
- 3) Regulate how and whom the AR layer will be furnished with targets;
- 4) Establish how the AR layer will integrate in the social and physical context.

## Chapter V: Conclusions

The present academic research aimed to provide a state of the art of the current technological and sociological advances towards the integration of Holograms in today's society. The Computer as a social actor paradigm has been the setting ground from where I proposed the implementation of the methodology. As technology keeps moving forward, it is a fact that the instinct and human behavior does not apply to the same time scheme. Therefore, it is necessary in the current digital age revolution to assess how it has impacted and how it has been introduced in our society. It is a novel paradigm that portrays the technological devices as social actors, thus, the development of the relationship between artificial intelligence and have proven to cause long-lasting effects. People are confiding more on the "neutrality" of interfaces than in humans. Considering this, it is interesting to look at a not so far future where science and the market will inevitably establish holograms as a new medium. With history on its back, there will be a high level of expectation about how true they will be implemented and adapted. If they will be similar to the details depicted in books and movies, demonstrating the cyberpunk prophecy the arts and humanities warned us about. Thinking on this prospective, I thought of how a misuse of the hologram would be by becoming part of just one more medium for

advertising. The strong potential it has can be used for altruist causes or it can be rationally applied once it's massively available on the market.

I have stated throughout the present research and backed by Johnston historic outline of human's narrative with holograms, how they have a strong latent potential of hopefulness in people's minds. It is a metaphor for the future. Therefore, as Ramlie et. al stated, advertising is at needs of new medias, and looking towards technological advancements is an opportunity to be highly considered. Taking --in my view and from what I have proposed and considered— a correct start can lead to a disruptive new start in advertising. Furthermore, equally as big is the risk of failure if its implementation is done incorrectly.

The different applications of Augmented Reality hololenses prove how different fields are interested in coupling to new technologies to their advantage. It is a subtle demonstration of how holograms will have a strong probability of integration as they are currently the most similar devices similar to this type of holographic nature. Moreover, its success comes from the subjective perceptions of each user and the complemented, sense of privacy with the sense of trustworthiness towards the devices. Additionally, as seen through the researches made by Xu and Rauschnabel the different modalities of the interface voice, visual and gesture, cover the multiple type of profiles and backgrounds of people. These examples illustrate an effective implementation of an Avant guard technology by not committing to the technology prematurely but having a good thorough investigation of its different appliances and uses according to a consumer perspective.

Through the implementation of my proposed methodology I hope to guide in the future a set of rules to follow and create a user guide in context of each product and message. Holograms already are a key element in an advertising campaign because of its novelty and people's desire of something new. Thus, to fulfill a consumer/user engagement, the experience throughout the whole introduction is the most valuable resource to make a good or bad engagement. Furthermore, it has to be evaluated the context where the holographic piece would be integrated to not annul its success, especially on the cultural context, according to each specific social, economic and cultural history. Also, the application of Scholz & Smith's framework of active and passive ingredients could be a strong hold of reference, as it includes the correlation of the content, the importance of the bystanders, the users and the background. As well, to use the guideline categories from the results obtained from the research.

In conclusion, my methodology was constructed by the combination of empirical and theoretical investigations implemented previously. Under the CASA paradigm I hope to respond to the answer; how do humans feel about holograms? And help to broaden the theory, prove the theory and in context to the current study be applied for a disruptive ad campaign. As well, I leave an open question taken from Noor (2016) that affirmed "As AI insinuates itself more fully into our lives, we may yet require a new social contract—one with machines rather than with other humans."

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