Mirror, Mirror on the Wall

A study of AR-powered Magic Mirror technology and its influence on consumer experiences and attitudes

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1. Abstract

Augmented Reality (AR) has been growing in popularity in recent years, and is becoming increasingly realistic. Several companies have started to use AR for the virtual testing of products, particularly within the beauty industry. With this study I aimed to determine how and why virtual augmentation of the physical self influences consumer experience and attitudes. In order to answer this question, I chose a qualitative and exploratory research design with an inductive approach. I did my main data collection process in London, where I visited four makeup boutiques employing AR technology for the virtual testing of makeup. I interviewed both employees and customers, and I observed customers interact with the technology. I supplemented my data with blog and vlog entries, and unstructured interviews with technology consumers. I found that AR technology influences consumers' attitudes towards experimenting with the self, and that it has the potential to influence consumers' experience of self. I propose that AR facilitates experimentation with the self by disconnecting the user from the cultural norms of the real environment, and that this dynamic allows consumers to construct different systems of preferences at different points of the Reality-Virtuality continuum. Furthermore, AR allows consumers to pursue an augmented version of themselves which is closer to their ideal self. I propose that consumers with a large discrepancy between their actual and ideal self are more likely to do so. Exposure to this self may cause a shift in the consumer's self-concept and cause dysmorphia. I theorise that this is due to the liminal nature of AR, which allows the user to construct a self which is neither fully physical nor fully virtual. My data indicate that AR can temporarily relieve cognitive dissonance and discomfort caused by self-discrepancy. Based on my study, I suggest a number of managerial implications.

2.   Preface

The topic of this thesis was inspired by my internship in the makeup industry in London. A part of my job was to visit cosmetics shops and stay on top of social media to collect information on any new innovations and launches in the industry. Several innovations using Augmented Reality caught my interest, and I wished to study them further to better understand how they affect consumers.

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3. Introduction

A woman is on the hunt for a new lipstick, and wanders into a makeup boutique. She sees in front of her a beautiful mirror, and as she touches it, a wide selection of different lipstick shades appears. She selects a coral red, and magically, it is applied to her lips in the mirror's reflection. She selects a berry shade instead, and it is instantly applied. This is not science fiction. So-called "Magic Mirrors" have been rolled out in several makeup boutiques for the last couple of years, and apps using the same technology is already accessible to all smartphone users. It is made possible by the use of Augmented Reality.

3.1 What is Augmented Reality?

Many consumers are still unfamiliar with the term Augmented Reality (AR), not realising that they use the technology frequently on their smartphones through apps such as Pokémon Go and Snapchat (Chamary, 2018; Sumra, 2018). These highly popular apps have in common functions where reality is combined with digital elements, or rather, that a virtual layer is put over the reality shown through the user's phone camera. In Pokémon Go this happens by placing a Pokémon creature in the user's surroundings, for instance in their living room (Chamary, 2018). Snapchat is well known for its filters, which through the selfie camera can transform the user's face with virtual makeup, accessories, or manipulations that changes the proportions of the face (Sumra, 2018).

The history of augmented reality goes back to 1968, when Ivan Sutherland created the first head-mounted display system (Augment, 2016). It showed the user simple wireframe drawings using computer-generated graphics. Many different AR-based innovations were made after that. However, the term "Augmented Reality" appeared only in 1990 in Tom Caudell's work (Augment, 2016).

One can describe AR as a virtual – or computer-generated – layer over reality. It supplements reality with virtual objects, which appear to coexist in the same space as the real world, and aligns real and virtual objects with one another (Azuma, et al., 2001). According to the Azuma et al. (2001) definition, AR technology should also "run interactively, and in real time". This means that it is not enough to have a digital layer over a static picture – it should adapt interactively to a real environment changing in real time.

The Reality-Virtuality continuum, as set forth by Milgram et al. (1994), is useful for understanding AR. The continuum, as shown in Figure 1, demonstrates the differences between easily confused terms such as Augmented Reality, Augmented Virtuality (AV), Mixed Reality (MR), and Virtual Reality (VR).

The Reality-Virtuality continuum places the real environment and virtual environment as two extremes of a continuum (Milgram et al., 1994). The real environment is governed by the laws of physics, while the virtual environment is completely synthetic and not limited by the rules of reality. Everything in-between these two extremes, where the real and the virtual is combined, is a form of Mixed Reality. MR is divided into two subcategories: AR, where the real environment is augmented with virtual objects, and Augmented Virtuality, where the virtual environment is augmented with entities from the real environment.

Figure 1: The Reality-Virtuality continuum, adapted from Milgram et al. (1994)

So far, AR technology has been adapted for eyesight, in that we *see* a virtual layer over reality. Nevertheless, AR could potentially apply to all senses, be it hearing, touch, or smell (Azuma, et al., 2001). For now, however, users normally experience AR by looking at reality through a technological device. This device could be a smartphone or tablet, a big screen connected to a camera, or a wearable such as smart glasses.

Although AR is one term, it offers a myriad of ways to supply reality with virtual elements. The technology has been used for both scientific and entertainment purposes. It was used in theatre for the first time in 1994, for Julie Martin's production "Dancing in Cyberspace" which featured acrobats dancing within and around virtual objects on the physical stage (Augment, 2016). The first AR mobile game was launched in 2000, called ARQuake (Berner, 2018). Similarly to Pokémon Go, it put virtual objects in the user's real environment (Piekarski & Thomas, 2002).

A variety of industries have applied AR to more practical purposes. The Air Force, NASA, and naval researchers were all quick to put the technology into use (Augment, 2016). AR has been used for medical surgery (Nanalyze, 2018), military training (Lynch, 2017), and

education (Blum, 2018). In medical surgery, AR can be used both as a visualisation and training tool (Azuma R. T., 1997). One can collect 3-D datasets of patients in real time, render and combine these with a view of the patient, and in effect give the doctor "X-ray vision". Military aircraft and helicopters have also for many years used Head-Up Displays and Helmet-Mounted Sights to superimpose informational vector graphics on the pilot's real-world view (Azuma R. T., 1997). As these examples illustrate, AR technology can add value to our society both by offering new forms of entertainment and by making certain tasks easier to do.

Many of the features of AR technology are made possible by the use of Artificial Intelligence (AI). Such features include physical environment mapping, depth perception, and rendering optimisation of graphics (Hall, 2017). One can define AI as a branch of computer science which has the object of simulating intelligent behaviour in computers (Merriam Webster, 2018).

AR developers such as Perfect Corp. have invested in AI-powered *deep learning* to optimise face detection and tracking in their beauty app (Alaimo, 2018). Rina Dechter introduced the term deep learning to the machine learning community in 1986 (Dechter, 1986). The field focuses on developing software which mimics the activity in the human neuron layers, so that the machines learn to recognise patterns in digital representations of data like sounds and images (Hof, 2013). It is likely that AI and deep learning will only become more important for the development of AR technology in the future.

Statista has forecasted that AR will have a global market size of $198 billion USD in 2025 (Statista, 2019). Goldman Sachs' base case assumption for AR and VR software revenue in 2020 is $13.1billion USD (Goldman Sachs, 2016). Compared to VR, AR has a big advantage in that many consumers can access such technology on smartphones which they already own, instead of needing to purchase new and costly headsets or devices (Perkins Coie, 2018).

3.2 Augmented Reality in marketing

AR technology has opened up new marketing possibilities for companies in various industries. According to the McKinsey report "The State of Fashion 2018", more than 75% of fashion retailers planned to invest in AI in 2018 and 2019. Many companies have done so

already. Goldman Sachs' base case assumption for AR and VR software revenue in retail is $0.5 billion USD for 2020 and $1.6 billion USD for 2025 (Goldman Sachs, 2016).

IKEA has put forth two apps over the past years that both allow customers to virtually place a piece of furniture in their homes to see how it will look before making a purchase. The IKEA Catalog App was launched in 2013 (Ridden, 2013), and IKEA Place was launched in 2017 (Dasey, 2017). In the first app, one used one's phone camera to scan a symbol next to a piece of furniture in the catalogue, and the catalogue would then be used as a marker on the floor for a virtual version of the furniture (Ridden, 2013). These features make the app an example of what Scholz and Smith (2016) call *Active Print* technology. In the IKEA Place app, the catalogue was no longer necessary in order to place virtual furniture in the home.

Another example of Active Print comes in the form of printed material which comes to life when viewed through a device. This was for instance done for the book "Prosthetic Reality" – an art book whose images are augmented with animations and sounds when viewed through an app on the user's smartphone or iPad (Starr, 2017).

A different type of AR technology is called *Bogus Window* (Scholz & Smith, 2016). This technology was used by Pepsi Max in 2014 when they turned a London bus shelter's wall into a fake window which showed unlikely objects such as tigers and flying saucers making their way down the street (Kastrenakes, 2014). The IKEA Place app that I mentioned earlier is an example of a more interactive and mobile kind of Bogus Window.

Scholz and Smith present a third type of AR technology called *Geo-Layer* (2016). This was used by the Sunshine Aquarium in Tokyo in 2014 (Holly, 2014). The aquarium was difficult to locate, and because of this it noticed a significant drop in attendance. To solve this problem, an AR-based app was built to help potential visitors locate the facility. The app used a completely different solution than other GPS apps, by having a team of penguins – which appeared on the street when looking through the smartphone camera - leading the consumer to the aquarium.

The final type of AR technology used in marketing mentioned by Scholz and Smith (2016) is the Magic Mirror. An example of this technology was Timberland's virtual fitting room, powered by Lemon & Orange (Lemon & Orange, 2018). Passing consumers could virtually try on clothing by using digital screens in the shop windows.

There are both physical and digital ways of augmenting ourselves and our environment. Physical ways of augmenting one's self may include for instance makeup, clothing, and

change of hairstyle. One could also augment the self through plastic surgery procedures. Augmentations to the environment could happen through the use of architecture, furniture and interior decoration, and gardening. With AR we can augment reality in a virtual way. We can augment the self through Magic Mirror technology, either on big screens or on smaller devices such as smartphones and tablets. Another way of augmenting the self digitally is the 'beautification' mode which is available in many smartphone selfie camaeras, which functions as a kind of digital makeup to smoothen out the skin. The environment can be augmented through Bogus Window, Active Print, and Geo-Layer technology.

To get a better understanding of different kinds of augmentation, I decided to sort them in a framework (Table 1). Here I only focused on superficial augmentations, and not augmentations of the mind or physical capabilities like strength. I also only looked at augmentations which happen in real-time, thus looking away from photo-editing software such as Photoshop, which can be used to augment any kind of photo.

The framework has two dimensions: Physical versus digital augmentation, and augmentation of the self versus augmentation of the environment. The first dimension is useful in relating something new – AR technology – to physical counterparts which have been part of everyday human existence throughout history. Augmenting reality is not a new concept, but doing it virtually is. Including both physical and virtual ways of augmenting physical reality in in the framework might help illustrate important similarities and differences between them. I included the second dimension because I think there is a highly relevant distinction between the augmentation of the self and the augmentation of our environment. One's relationships between one's self and one's environment are likely to differ, for several reasons. We move through many different surroundings throughout our lifetime, but we cannot move through different selves, only adapt and modify the one we have. The changes one can make to one's self tend to be more limited than those one can make to one's surroundings – and yet one's physical self may be more closely connected to one's identity.

	SELF	ENVIRONMENT
Physical	Dress Plastic Surgery	Architecture Gardening Interior Decoration
Digital	Magic Mirror Beautification Selfie Mode	Bogus Window Active Print Geo-Layer

Table 1: A framework of augmentation

3.3 Point of departure and research question

As I have described, AR technology comes in many different forms. In my research I have decided to study digital ways of augmenting the self, as seen in the lower left corner of Table 1. This includes technology such as Magic Mirrors. Magic Mirror technology shares important traits with other types of AR technology, but as mentioned, the consumer is likely to have a different relationship with herself than with her environment. Magic Mirror technology may also augment the consumer in ways that are feasible by physical means, but her user's attitude and behaviour towards the augmentation may once again be different due to the fact that the augmentation is digital. This leaves room for exploration.

The concept of digital augmentation of the physical self is interesting in this age where sharing photos of one's physical self on digital platforms has become normal. Technology like Magic Mirrors offers virtual ways both to experiment with appearance and to try on cosmetics, clothing, and fashion items without a physical sample of the product. It therefore seems to have potential as a marketing tool.

Knowing that AR technology for altering self-appearance is being used to an increasing extent in entertainment and marketing, it is important to get an understanding of how augmenting our physical selves by virtual means may influence consumer experiences and attitudes. Such an understanding may guide us in better taking advantage of the technology, in terms of knowing where and when it is useful. It can also give insights into how the technology can be adapted to be more useful or attractive to the consumer, and reveal potential positive and negative effects it may have on the consumer. This leads me to my research question for this paper:

> **RQ: How and why does virtual augmentation of the physical self influence consumer experiences and attitudes?**

To explore this question, I decided to do my research on Magic Mirrors developed for the beauty industry – that is, Magic Mirrors for the virtual testing of makeup. I found the aspect of studying AR in the setting of the beauty industry interesting, because makeup in itself is a way of augmenting reality. Thanks to my previous internship in the beauty industry in London, I already had some insights into the digital innovations happening there. The fashion industry has similar developments, but to my knowledge there are few clothing stores that actively use this kind of technology yet apart from in marketing stunts. The Magic

Mirror technology I have seen being used in fashion looked much less realistic than what I have seen used in makeup, and the mirrors seemed less able to register and adapt to the consumer in front of the mirror.

These virtual mirrors can be found in a few makeup shops, as smartphone apps, and on e-commerce sites. They all have more or less the same kind of technology, but the environment and usage situation may vary significantly. A big difference between the in-store Magic Mirrors and the app-based ones is the setting of the makeup store. Part of the rationale behind many of the apps and e-commerce try-out tools is that they allow the user to get a better impression of what the product will look like on them when shopping online, as a physical sample is not available. In a makeup shop, however, sample testers of the products are normally available, and there are often professional makeup artists there to offer both expert advice and beauty makeovers.

3.4 Literature review

The construction of self-presentation is an essential topic in my research, and in my literature review I will discuss it both in the context of the physical and virtual world. From these contexts I will approach the construction of self-presentation in AR. I will also present some existing theories of technology adoption, as well as existing research on AR technology.

3.4.1 Self-presentation in the physical world

AR technology allows the user to virtually change their appearance through digital clothing, makeup, and various forms of manipulation. Changing one's appearance is not a new concept, however. In a sense, makeup and clothing can also be used as a means of augmenting reality – that is, improving what nature gave us appearance-wise. In order to fully comprehend why someone might want to change - or experiment with - their appearance on a virtual platform such as a Magic Mirror, we should have some understanding of why people have chosen to augment, modify, or experiment with their appearance by traditional means. Going back to the Reality-Virtuality continuum (Figure 1), I will define this as constructing self-presentation in a real environment.

Humans differ from other animals in that we do not quickly lose interest in mirrored surfaces (Rehak, 2003). The mirror stage, as described by Jacques Lacan (1977) occurs in human infants between the ages of six and eighteen months, when they for the first time are faced with their own reflection and respond to it as an aspect of themselves. Lacan theorised this act as fundamentally self-alienating, forming the ego and causing a split between one's authentic subject and one's identity. This is because recognising oneself as "I" is at the same time like recognising oneself as other – that the person over there in the reflection is yourself. Throughout human history, we have found various ways to change the appearance of the self in the mirror.

Changing our appearance by the means of makeup, clothing, and body modification is an ancient concept (Walter, et al., 1999). Roach-Higgins & Eicher (1992) defines the dress of an individual as "an assemblage of modifications of the body and/or supplements to the body". There are several reasons behind our uses of dress. To some extent dress is practically motivated, offering warmth or protection to the body, or enhancing our capabilities as is the case with glasses. In my research however, I am more interested in the other reasons for why we might choose a certain form of dress.

Dress has communicative power, and can help make a statement about aspects of age, gender, social class, school affiliation and religion (Roach-Higgins & Eicher, 1992). Dress is a means for individuals to express statements about their identity visually (Bennett, 2005).

Fashion has been compared to a code, in that different combinations of clothing can register meanings which are sufficiently consistent between the wearer and the observers (Davis, 1992). As a mode of communication it however differs from speech in that meaningful differences between the clothing signifiers are not as sharply drawn and standardised as they are with words. The exact meanings communicated by the objectively discernible types of dress will depend on each person's subjective interpretation (Roach-Higgins & Eicher, 1992). Yet it can also be argued that in some cases, cosmetics and clothing may be a more reliable communicator than words, due to being more costly (Power, 2010).

A study of teenage consumers found that their clothing choices are closely bound to their self-concept, and that clothing is used as a tool for self-expression (Piacentini & Mailer, 2004). Clothing also has a function in role fulfilment, in that they can make the wearer more confident and capable, and may also help teenagers judge the people and situations they face.

Another study of young professional men found that the participants' use of dress was connected to feeling complete in one's work identity. Participants who did not perceive themselves as complete in their work identities would use and plan purchases of wearable items that were symbolic of their profession (Kang, Sklar, & Johnson, 2011).

How appearance is connected to identity has been subject to change throughout history (Roach-Higgins & Eicher, 1992). For instance, high heels were originally designed to be worn by men (Kremer, 2013). We do not only use dress in order to communicate identity. We also use it in order to look better, closer to some ideal of beauty held by ourselves or society (Saltzberg & Chrisler, 2006).

The desire to get closer to our ideal self is described in self-discrepancy theory (Higgins, 1987). Self-discrepancy theory describes how different types of *discrepancies* between representations of the self are associated with different kinds of emotional vulnerabilities. In the theory, the *actual self* signifies a representation of the attributes which you or someone else believes you to actually possess. The *ideal self* is a representation of the attributes which you or another person would like you to possess. There is also the *ought self* - a representation of the qualities which you or someone else thinks you should possess, out of duty or obligations.

According to the theory, there are six fundamental self-state representations, which are as follows: actual/own, actual/other, ideal/own, ideal/other, ought/own, and ought/other (Higgins, 1987). The first two - but particularly the first one - make up the person's *self-concept*, while the other four are called self-guides. The theory postulates that people differ with regards to which self-guide they are most motivated to meet, and that people are motivated to try reaching a state where their self-concept matches their personally relevant self-guide.

Some people will therefore be motivated to reach a state where their actual self matches their ideal self, as seen by others or by themselves. Research indicates for instance that women with a higher body-related self-discrepancy care more about clothing (Kim & Damhorst, 2010). A discrepancy between the actual and the ideal self is associated with dejection-related emotions such as sadness, disappointment, and dissatisfaction (Higgins, 1987).

We use dress to get closer to our own ideal, or to get closer to our idea of someone else's ideal. For instance, we can use dress to look more attractive for potential romantic or sexual

partners. Research has shown that the colour red increases men's attraction to women (Elliot & Niesta, 2008), and so does high heels (Guéguen, 2014).

Dress can also be used as a form of camouflage, to fit in and not stand out from the cultural norm (Korichi et al., 2008). Fashion can be defined as "strong norms about appropriate appearances at a particular point in time" (Crane, 2000), and to some extent most consumers use dress in order to be in accordance with these norms.

3.4.2 Self-presentation in the virtual world

As described previously, our appearance can be a tool to communicate our identity to others. Some aspects of our appearance, such as clothing, makeup, and hairstyle, are all relatively easy to change and adapt. Other parts of our appearance are much harder to change, such as skin colour, height, bone structure, and perceived gender. Through virtual platforms, however, there are far more possibilities. Remembering the Reality-Virtuality continuum again, I will present ways in which consumers construct self-presentation in completely virtual environments.

One study found that among adolescents who use the internet for Instant Messaging or chat, 50 percent of the study participants indicated that they had previously engaged in web-based identity experiments. The main motives for this were self-exploration in order to see how others would react, social compensation to overcome shyness, and social facilitation to form relationships (Valkenburg, Schouten, & Peter, 2005).

A more visual way of experimenting can happen by the use of *avatars* in video games. An avatar can be defined as a virtual, surrogate self, acting as a stand-in for our real selves (Wilson, 2003). Avatars are unique in that they can be customised, for instance when it comes to appearance and skill-level (Waggoner, 2009). Gamers experiment with such avatars in a multitude of ways, from trying on a different gender or ethnicity (Nakamura, 2001) to creating something closer to their ideal selves than they themselves are (Bessière, Seay, & Kiesler, 2007). An interesting form of identity experimentation called *identity tourism* has been observed in multiplayer video games and on internet forums (Nakamura, 2001). On these platforms, other users are unable to check the real identity of the user without resorting to hacking methods. This makes it possible for the users to take on a

completely different identity both gender- and race-wise by the use of avatars or by customising one's details and profile picture.

In the book "What Video Games Have to Teach Us About Learning and Literacy" (Gee, 2003), James Gee presents *projective identity* as a third type of identity for the video game player which differs from both real-world identity and virtual identity. The player projects her own values and desires onto the virtual avatar, and the avatar is seen as her own project in the making. Zach Waggoner (2009) builds on this discussion, suggesting that Gee sees the projective identity as *liminal space*. Liminality is the middle stage of a passage between separation and reincorporation, a treshold where one belongs to neither of those two phases. At such a phase of transition the normal limits to self understanding are relaxed, consequently opening up for something new.

With today's great selection of video games, there is barely any limit to how many avatars gamers can create and experiment with. Such games not only allows users to construct and mobilise a surrogate self, but also allow them to construct a plurality of *shifting* selves (Wilson, 2003).

3.4.3 Augmented Reality and technology adoption

I have now discussed the construction of self-presentation both in completely real and completely virtual environments. For both of these topics, plenty of research is available. There is however little research on the middle points of the continuum – Augmented Reality and Augmented Virtuality (AV) - with regards to the construction and modification of the appearance of the self.

In a physical environment, self-presentation is changed by physical means. That is, a physical altering of the physical self. In a virtual environment, everything including the self and the alterations are purely digital, and we have a virtual altering of a virtual self. How does this look for AV and AR?

AV augments the virtual world with elements from the physical world, which can for instance be used to make virtual experiences more immersive (Ness Corporate, 2016). AV could make it possible to augment a virtual self with elements from the physical world. In the case of AR, we have a virtual altering of the physical self. As I have described

previously, this is already possible through existing technology. The adoption of such technologies is necessary in order to virtually alter the physical self, and I will proceed with existing theories of why and how new technologies are adopted by consumers.

A well-known model for the adoption of technology is the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989).

Figure 2: Technology Acceptance Model (TAM) (Davis et al., 1989)

According to the model, the two key factors which influence the attitude towards using the technology are *Perceived Usefulness* and *Perceived Ease of Use* (Davis, Bagozzi, & Warshaw, 1989). Perceived ease of use was defined as "the degree to which a person believes that using a particular system would be free from effort" (Davis, Bagozzi, & Warshaw, 1989). Perceived usefulness was defined by Fred Davis as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, Bagozzi, & Warshaw, 1989). Expansions of the model has been proposed, and one such expansion also includes *joy* and *curiosity* as factors which may influence the behavioural intention to use the technology (Lowry et al., 2013).

While factors such as perceived usefulness, perceived ease of use, joy, and curiosity are likely to be relevant for adopting AR technology, the model might be too limited. AR technology including Magic Mirrors is not always useful in nature - sometimes it is employed purely for entertainment. Even when it is made to be useful, one could argue that game-like elements remain. To open for a more complex consumer behaviour I will supply the TAM model with a model by Jon Elster (2009) (Appendix 1), who describes action as being driven by *desires* (preferences), *beliefs*, *emotion* and *information*. Although the TAM model includes two beliefs, perceived usefulness and perceived ease of use, it does not take into account desires or emotions; and it excludes other types of beliefs.

Elster's model of action importantly differs from a theory of rational action, where desires, beliefs and information should be enough to act (Elster, 2009). Agents tend to be irrational, and one of the most important sources of irrationality is emotion, which has the power to influence action either directly or indirectly through the four other pillars of the model. Emotion arises from beliefs, and influences them in turn (Elster, 2009). Emotion has the power to temporarily invert or reverse a consumer's preferences, and the urgency of emotion can also induce a preference for immediate action over deferred action.

How the AR technology in question will be adopted, and how it will be used, will therefore both depend both on the consumer's judgement of its usefulness and ease of use, as well as a combination of desires, emotions, beliefs, and information held by the consumer.

AR can be looked at as a part of a *digital transformation* happening to retail, allowing products to be explored both in digital and analogue ways (Hagberg, Sundstrom, & Egels-Zandén, 2016). Using AR technology as a tool in marketing and retail is a relatively new concept, and the research on how it affects consumer attitudes and experience is still sparse. I have tried to explore the research which does exist about this topic, focusing especially on AR technology which allows the user to change their physical appearance virtually.

When used effectively, it appears that Augmented Reality can encourage purchases. Research by Beck and Crié (2018), and Yim et al. (2018) found that AR technology for trying on clothing and fashion accessories could increase purchase intention. This was connected to an increase in specific product curiosity (Beck and Crié, 2018) and the generation of greater novelty, immersion, enjoyment, and usefulness (Yim et al., 2017).

AR has been discussed as a type of *interactive technology* (Javornik, 2016a). Yim et al. (2017) found that *immersion* mediates the relationship between the factors of interactivity and vididness - or realism - and the two outcome variables usefulness and enjoyment. Similarly, Javornik (2016b) found *flow* to mediate effects of perceived augmentation on consumers' behavioural intention and affective responses. Javornik (2016a) stated that flow is one of the most consistently confirmed effects of interactivity, for which immersion is one of several measures.

An interesting aspect of digital try-on technologies is how the user's appearance seems to play a part in the visualisation on the screen. Research by Yim and Park (2018) and Cho and Schwarz (2012) indicated that the user's perception of their own appearance influenced their evaluation of the try-on experience. Yim and Park (2018) found that consumers who

perceived their body image in an unfavourable way recorded more favourable evaluations about AR-powered virtual try-on of clothing than about traditional web-based product presentations. Consumers who perceived their body image in a favourable manner however, recorded no differences in their responses for the two different presentations. Similarly, Cho and Schwarz (2012) found that consumers evaluated a product more favourably the more they liked the static image used to construct a virtual mirror. Both a happier facial expression and visual enhancement for improving the skin condition made the participants like the image more.

The effects of AR may however depend on how realistic the technology is. Cehovin and Ruban (2017) studied the L'Oréal Makeup Genius app, and found that a perceived lack of realism prevented the participants from experiencing the augmentation as helpful, and they stated doubts as to whether the products would appear the same way in reality. This corresponds to the finding of Yim et al. (2017) that vividness improved perceived media usefulness by increasing immersion.

Some research indicated the importance of *context* for the consumer experience. Joachim Scholz and Katherine Duffy (2018) found that the atmosphere of the home – explained to be intimate, familiar, casual and relaxing – allowed the consumers to interact with the Sephora Virtual Artist app in ways that felt personal and supportive of both self-expression and experimenting with the self. Inversely, Poncin and Mimoun (2014) stated that interactive technology in the form of a Magic Mirror and interactive game terminals in a toy store could contribute to constructing an appealing store atmosphere. It therefore appears that the surrounding atmosphere may be important for the user's evaluation of and behaviour with the technology, but that AR technology in itself could also positively influence the surrounding atmosphere.

From existing research, it definitely seems like the adoption of AR technology is complex. This illustrates why the TAM model (Figure 6) does not suffice, and why I also need to take into consideration emotions, desires, and other beliefs. Below is an overview of existing research I have presented, sorted after the pillars of the Elster model for Action: emotions, desires, beliefs, and information.

CATEGORY	RESEARCH
Beliefs	Media usefulness: vividness (Yim, Chu, & Sauer, 2017) Perceived helpfulness: realism (Cehovin & Ruban, 2017)
Emotion	Product curiosity (Beck & Crié, 2018) Immersion and enjoyment (Yim, Chu, & Sauer, 2017) Flow (Javornik, 2016b)
Desires	Preference: realistic augmentation (Cehovin & Ruban, 2017) Preference: attractive augmentation (Cho & Schwarz 2012)
Information	Influence on atmosphere (Poncin & Mimoun, 2014) Influence of atmosphere (Scholz & Duffy, 2018)

Table 2: Overview of existing research

3.4.4 Summary

In my literature review I discussed the concept of constructing self-presentation, and presented research about how and why consumers do this both in completely physical and completely virtual worlds. Traditionally we construct our self-appearance as a way of communicating our identity to others. Completely virtual worlds do however give users a way to try on and experiment with completely different identities, in ways that are often impossible in real life. Augmented Reality is at an interesting place in-between these points, where one can alter physical self-presentation by virtual means. I was curious as to how construction of self-presentation happens when physical and virtual worlds meet. To understand the adoption of AR technology, I stressed that we cannot simply look at perceived usefulness and perceived ease of use as shown in the TAM model. Factors such as emotions, desires, and other beliefs are likely to play an important part as well.

Finally, I presented existing research on AR technology and Magic Mirrors. My impression is that most research has been done quantitatively on chosen participants, which have tried out either apps or websites with AR solutions. The findings mostly concern factors such as usefulness, purchase intention and product evaluation, and atmosphere. While such studies

are definitely valuable, they might suffer from being too controlled and superficial. Interesting user patterns or user groups may not be discovered, and the deeper effects on the individual consumers may not be understood.

I wished to study the use of this technology in spaces where I had no control over the participants or how they would interact with the technology. I also wished to observe how consumers used the technology among other consumers compared to how they might use it in private. With my research I thus hope to generate deeper and more nuanced insights into how and why virtual try-on technology affects consumers.

4. Research design

In the following section I will describe the research design of my study. This will include methodological choices and a discussion of ethical and validity matters.

As mentioned previously, I found there to be a lack of theory and understanding regarding how and why virtual augmentation of the self affects consumers beyond factors such as purchase intention and technology evaluation. In order to develop such theory, I decided on an *exploratory* and *qualitative* research design with an *inductive* approach (Saunders, Lewis, & Thornhill, 2016). Data was collected both through semi-structured interviews, blog and video blog (vlog) entries, making it a *multi-method* qualitative study.

The data collection was non-standardised so that questions and procedures could alter and emerge during the research process. To some extent, data collection and data analysis overlapped, allowing me to make adjustments during the data collection process, which is useful in inductive research and theory building (Eisenhardt, 1989). This gave me the flexibility of taking advantage of new data collection opportunities and obtaining deeper insights into emerging themes.

4.1 Data collection

As AR is a relatively new and complex topic, I wished to gather data from several different sources to obtain multiple perspectives, and the multi-method approach allowed me to do so.

The main data collection process happened on a research trip to London, where I visited four makeup boutiques which employed Magic Mirror technology, where I could both test the technology myself and interview and observe customers and employees. I supplemented this research with unstructured interviews on technology habits, and blog and video blog (vlog) entries. An overview of the collected data follows in Table 3.

Shop employees	8
6 women, 2 men	
Shop customers – observed and interviewed	
Interviewed:	5
Observed: 4 groups, total:	7
First-hand tested technology	6
Technology consumers	7
Vlog entries	8
Approximate percentage male	*50%*
Approximate percentage female	*50%*
Blog entries	26
News articles	32

Table 3: Overview of collected data

4.1.1 Preparations

Before embarking on the research trip, it was important to ensure that I had competent knowledge on the research topic. As mentioned I do have work experience from the makeup industry in London, but my knowledge of AR technology was limited. I conducted thorough research on AR and Magic Mirrors, as well as on what solutions were available on the market or had been done in the past. A simple outline of my data collection process can be seen in Figure 3.

Preparations
Research
Unstructuctured
interviews

Visits to makeup boutiques
Customer interviews
Customer observations
Employee interviews
In-store technology testing

Supplementing data
Vlogs
Blogs
App testing
Unstructured interviews

Figure 3: Overview of data collection process

4.1.2 Interviews on technology habits

Throughout my research project I carried out out eight unstructured interviews with seven different consumers on their habits with technology. I did six interviews before embarking

on my research trip and two of them after. I interviewed one of the respondents both before and after my research trip, as the experiences she brought up regarding dysmorphia turned out to be highly relevant for what I found during the research trip.

In the initial interviews, I would simply ask the respondents to describe their everyday technology habits. This question led to different kinds of discussions with each user. In some cases this brought up interesting topics which turned out to be relevant for my research later.

The conversations were mainly done face-to-face, while three out of eight interviews were done over chat to access active and successful users of the app Instagram. These Instagram users appeared to have a strong digital identity and frequently shared photos of their own face, and the discussions with them uncovered interesting perspectives on identity, appearance, and self-enhancement on digital platforms.

Before embarking on my research trip I did an initial analysis of the first five interviews by studying and comparing the responses. The idea behind these interviews was to have casual conversations which could lead to insights on technology habits, experiences, and attitudes among different types of consumers. This could improve my understanding and judgement of the research topic, and even make me aware of certain topics to keep in mind throughout the project.

The final two interviews were done in order to refine my findings, and I adapted my questions. Adding these interviews allowed me to further explore emergent themes (Eisenhardt, 1989). I asked the interviewee who I had talked to once before to tell me more about her experience with dysmorphia and technology. I also interviewed another consumer who invests a lot of time and effort in her beauty routine about her preferences when shopping for cosmetics and her thoughts on the increased use of technology in the beauty industry.

4.1.3 Interviews at makeup boutiques

I chose London as the location for my research as I knew of two makeup boutiques there which use Magic Mirror technology. While there I experienced a *snowball*-effect where my interviews led me to two more makeup boutiques with AR-powered Magic Mirrors. I was able to first-hand test the Magic Mirrors in all locations and interview the employees about

them. In one of the shops I was also able to interview customers and observe them interact with the mirror.

Interview strategy

Semi-structured interviews are often used in exploratory research (Saunders, Lewis, & Thornhill, 2016). I chose this data collection method for my research because the questions I desired to ask were both complex and open-ended, and because I wanted to make it possible for the interviewees to explain and build on their responses. To get a rich collection of data it was also important for me to be able to adapt the questions and ask follow-up questions along the way if any interesting statements were made.

The interview strategy involved an interview guide (Appendix 5 and 6) with mainly open-ended questions, with the possibility of adapting the interview depending on the interviewee's statements. It was important not to sway the interviewees in any particular direction, and to keep the interview open and flexible enough to be able to discover and explore any interesting thoughts.

To employees, I asked questions such as: "Describe how a typical customer behaves when interacting with the Magic Mirror," and "What do you think of Magic Mirrors?". To customers, the questions included: "Describe your most recent experience with using the Magic Mirror in this shop," and "How would you compare trying makeup virtually in a Magic Mirror versus physically testing makeup?"

Conducting the interviews

At each location I wrote down *contextual data* (Saunders, Lewis, & Thornhill, 2016). This included concrete factors such as the date and time, but also the shop atmosphere and store activity. When interviewing anyone, I took note of factors such as their gender, approximate age and the approximate time of which they have been working for the brand. I also took notes of nonverbal communication such as their body language, tone of voice, as well as the impression they left on me. Though such factors might feel unimportant at the moment, they can help give context to the interviews and the statements that were made. An example of this were the different emotional reactions I observed after asking the employees "How do you believe a magic mirror will influence the role of in-store makeup experts?". Some of the employees appeared very defensive when responding to the question. This was particularly interesting because two of the employees answered in a way which contradicted their answer to the question "What do you believe of the future of Magic Mirrors?". Their nonverbal

communication gave me insight into the emotions which may have caused their answers to contradict one another.

My intention was originally to record the interviews. However, most interview subjects were uncomfortable with the idea of being recorded. As I did not wish to cause my subjects any discomfort, I resorted to taking handwritten notes instead. Had I recorded the interviews under such circumstances, it could have caused interviewee bias, where the interviewees might have been less comfortable with opening up and sharing their personal thoughts (Saunders, Lewis, & Thornhill, 2016).

I conducted the interviews in the makeup boutiques. This is a location the employees are used to and comfortable in, and it was more natural to interview customers in a location where the Magic Mirror technology could be found. Staying in the makeup boutiques also allowed me to interview customers after having observed them, and try the Magic Mirror with customers who had not yet tried it. I decided to be careful when approaching customers for interviews, as I did not want to scare them away, causing a loss of sales or potentially making them less likely to return to the shop in the future. My experience was however that the customers I approached were more than happy to talk to me.

My interviews happened over three days. I would take time after each interviewing session, when the memory was strongest, to digitise and sort the interview notes. When this was done, the interviews were studied and compared as part of an initial analysis before the next session. This analysis came in two parts: *Transcript summaries*, which summarised the key points that emerged from that session's interviews and observations, and *interim summaries*, where I summarise what I found so far, the level of confidence I had in my findings, and what I needed to do to improve the quality of my data (Saunders, Lewis, & Thornhill, 2016). I would also keep a research notebook during the research and analysis period to write down ideas as they occurred. Such field notes are an important way of accomplishing an overlap between data analysis and data collection (Eisenhardt, 1989), and allows themes, patterns, and relationships to emerge as the data is collected (Saunders, Lewis, & Thornhill, 2016).

Observations

In one of the makeup boutiques I was able to observe customers as they interacted with the Magic Mirror. I managed to interview two of these customers right after they had tested the mirror, and one customer agreed to test it along with me. I took handwritten notes of the

observations. If I was observing from a distance, I wrote down keywords as I observed, which I connected into a detailed summary once that observation ended.

I observed customers for the duration of the interaction with the mirror, which lasted from about two to five minutes. I observed four different groups of people: one big family, one small family, a pair of friends, and finally one woman who agreed to try the mirror together with me. Later on in my research I also found a video of a man interacting with the same mirror.

When observing customers and watching vlogs, I had some key factors which I looked for and noted: I was interested in the gender and approximate age of the person testing the mirror, the duration of the testing, and whether the user was trying it alone or with someone else. I took note of the mood of the user throughout the interaction with the Magic Mirror. In particular, I wanted to see how different kinds of options influenced different kinds of emotional reactions. Any difficulties throughout the interaction were also of interest, as well as how the user reacted to these.

4.1.4 Vlog and blog entries

After the research trip I supplemented my data with vlog and blog entries. There were two main reasons for this: Firstly, I wanted to explore if there were similarities or differences between how people interacted with Magic Mirrors in servicescapes and how they interacted with Magic Mirror apps in their homes. I also wanted to ensure that I understood certain behaviour patterns I had discovered during my research, such as men using the Magic Mirror while waiting for their wives and girlfriends. Vlogs in particular allowed me to observe similar behaviour in a different setting. Furthermore, blog entries allowed me to study a different kind of user testimonial than I had obtained in my interviews, where bloggers had carefully reviewed one Magic Mirror tool or compared several. Overall, this final data collection process helped in building on themes and topics which had emerged during my research trip, and in affirming or rejecting potential trends.

I watched in total eight vlog entries from different users, most of them found at the video sharing platform YouTube. The videos show various vloggers interact with Magic Mirror technology for makeup testing. This includes both Magic Mirrors in shops and at events, and Magic Mirrors in the form of smartphone apps or desktop solutions for e-commerce sites. In

some of the videos the vloggers reviewed the technology, while in others they simply filmed while they interacted with it. Women and men are equally represented in the selection of videos.

To turn the videos into information which would be possible to analyse together with my interviews, I used the following strategy: I first watched the video twice, and then, watching the video a third time with pauses, I took notes of what happened and what was said in the video. This would be a similar process to transcribing a recorded interview. I would skip the transcription of any parts in the videos that were irrelevant due to the vlogger discussing unrelated topics.

When collecting data from written blogs, I read thoroughly through each blog entry and added any interesting statements to the rest of my data.

4.1.5 Tested technology

It was important for me to try out the relevant technology first-hand as much as possible, to better understand it, and also to see how I personally reacted to it. I was able to test the Magic Mirrors in each the four makeup boutiques I visited. These will be described and compared in a later section.

I also tested the YouCam Makeup app, and the virtual try-on tool on the L'Oréal Paris US website. While the in-store setting was not present for these two, the technology itself was mostly the same, with small variations. Testing more of the available solutions once again helped broaden my understanding of Magic Mirrors used for the testing of makeup and the potential of such technology.

When testing Magic Mirrors, I was particularly interested a few key aspects: If the mirror was in a shop, I made a note of how it was designed physically, and where it was placed. For instance, the Charlotte Tilbury Magic Mirror was designed as a full-scale vanity mirror (see Appendix 2) and placed in a corner of its own, while the other mirrors I tried in-store were on iPads, and placed among the makeup samples. Secondly, I was interested in how realistic the augmentation looked, how well the mirror detected my face, and whether it functioned in real-time or as a static picture. One of the most important aspects was the number of products and product categories which I could test in the mirror, and the degree to which I could customise a makeup look myself by combining different options. I also took note of

the availability of information about the products I tried in the Magic Mirror, as well as how easily I could share my augmented makeup look with others.

After each day's session I would write down a summary of any Magic Mirror technology I had tested. If possible I would also take a photo of my own interaction with the mirror, both for the sake of illustration and to better remember their individual features. The photos can be found in the appendix.

4.2 Data analysis

In qualitative research, meanings are mainly derived from words and images, instead of numbers (Saunders, Lewis, & Thornhill, 2016). The data collection process left me with a large mass of documents with text that needed to be analysed. In this section I will explain how the data analysis was conducted. A step-wise overview of the data analysis process is shown in Figure 4.

As I had chosen an inductive approach, my goal was to build up theory that was well grounded in my data (Saunders, Lewis, & Thornhill, 2016). Starting with my collection of data, I found themes to follow up and focus on. This meant that my research did not start out with a clearly defined theoretical framework. This was in order to avoid being desensitised by existing theory, and to allow new theory to emerge from the data collection process. Existing literature was then reintroduced later in the theory development process, in order to compare emerging concepts with the extant theory (Eisenhardt, 1989).

I conducted the main data analysis subsequently of the data collection, when interviews, observation notes, and video transcripts were all readily available in separate documents. I initiated a *thematic analysis* of these documents. A thematic analysis is useful for understanding large and diverse amounts of qualitative data, and to integrate related data from different notes and transcripts (Saunders, Lewis, & Thornhill, 2016). From the integrated data I could identify key themes or patterns for further analysis.

I used an inductive approach to the thematic analysis. This means that I did not use a framework based on existing theory to examine the data (Saunders, Lewis, & Thornhill, 2016). Instead, I derived the themes from the data. The thematic analysis followed these steps as described by Saunders et al. (2016): First I became familiar with the data by thoroughly reading through it. Then I categorised data with similar meanings. There are

several approaches for selecting categories, but after examining my data I decided to simply choose them myself (Eisenhardt, 1989).

I categorised my data using a spreadsheet, with the common denominator of each category as the header of a column, and each piece of categorised data in cells underneath. Each piece of categorised data was marked with a code indicating which data source it was taken from. When the data had been categorised, I searched for themes and relationships, seeing how the different categories might fit together to allow for further analysis.

1 Become familiar with the data

2 Categorise data with similar meanings

3 Search for themes and relationships

4 Refine themes and test relationships

5 Explore themes and relationships in existing literature

Figure 4: A step-wise overview of the data analysis process

An example of such a theme was *experimenting with the self*. In this category I put every quote and observation having to do with experimenting and playing with ones' appearance by the use of the Magic Mirror technology.

The next step was to refine the identified themes. Through constant comparison between the data and the constructs, I refined the definitions of the themes (Eisenhardt, 1989). If there was any apparent relationship between the themes, this needed to be tested. "Testing" in this case meant to seek alternative explanations and negative examples that did not fit with the relationship (Saunders, Lewis, & Thornhill, 2016). For instance, several employees had reported to me that they had observed men playing with the Magic Mirrors while waiting for their wives and girlfriends. I wanted to know if this was connected to a desire for experimenting with the self. An alternative explanation could have been that the men were simply curious of the technology, or using it only as a way to pass the time. In my case I

supplemented the employee interviews with vlogs of men trying out different types of Magic Mirror technology for makeup testing, where the aspect of needing to pass the time was not present, and where the degree of experimentation and play went beyond what would be necessary to simply test the workings of technology. This strengthened my confidence in that there was something more driving the behaviour of these consumers.

When themes, relationships, and patterns had been identified, I compared them to existing literature. This is an important step in inductive research, as the findings tend to rest on quite a small number of cases (Eisenhardt, 1989). I particularly studied theory and literature which could help explain and better understand the phenomena I had identified, and contextualise them in relevant fields. For instance, self-discrepancy theory became relevant in order to understand how some consumers react to being exposed to a more ideal version of themselves.

4.3 Research ethics

Ethics should to be an important part of any research project, to ensure that the research design does not subject the participants to embarrassment, harm, or any other kind of disadvantage (Saunders, Lewis, & Thornhill, 2016).

To ensure this, I made a few playing rules ahead of the research. Before conducting any interviews with shop employees or customers, I always went to see the person in charge, preferably the store manager, to present myself, the project, and the type of questions I wanted to ask. This was a way of ensuring that no employees would risk negative consequences by talking to me. While the responsible person in one boutique was happy right away to let me interview both staff and customers, I was sent away twice in another shop, as the employees did not know if the manager would support my project. When I finally returned and the manager was present, she was more than happy to answer my questions and letting me test their AR technology.

I ensured that every individual I interviewed knew what they were taking part in by presenting the research project and the at kind of questions I would be asking them. I made it a rule to never interview anyone who seemed uncomfortable with it. While these cases were rare, they did occur, and then I simply thanked them and move on.

As has been discussed previously, I had originally planned to record the interviews, but this made most interview subjects uncomfortable. To avoid causing any discomfort, I decided to work around this by taking notes.

4.3.1 Confidentiality and anonymity

The interviewees were assured full anonymity when participating in the project. As it was not necessary, I did not collect any data that was clearly attributable to a particular individual, such as name or exact age (Saunders, Lewis, & Thornhill, 2016). I did however make notes of certain identifiable factors, such as gender, approximately how long they had been working for the company, and approximate age. To still ensure anonymity, I have codified the contextual data in a way that will only be understood by myself, and I keep the contextual data stored away from the interview transcripts. The contextual data will not be shared with anyone but myself and is to be deleted when no longer necessary for the research project. On an organisation-level, although I mention what shops were involved and what technology they have publicly in their shops, I keep confidentiality on what interview data was collected from which location.

4.4 Research reliability and validity

There are appropriate types of measurement validity to evaluate quantitative research, but these are often considered both philosophically and technically inappropriate for qualitative research (Saunders, Lewis, & Thornhill, 2016). Therefore this research project will use alternative measures of quality, namely *dependability*, *credibility,* and *transferability*.

Dependability is the parallel criterion to reliability (Saunders, Lewis, & Thornhill, 2016). For the research to be dependable, the researcher should record the changes and emerging research focus, so that it can be understood and evaluated by others. As my study is inductive, topics naturally emerged from the research process. This is described in the Results section. The snowball effect described previously was also something which affected the research. I tried to be transparent about this process and the emerging focus resulting from it.

Credibility is the parallel criterion to internal validity (Saunders, Lewis, & Thornhill, 2016). For the research to be credible, it is important to ensure that the research participants'

socially constructed realities are represented in a way which match what the participants intended. While this can be difficult to perfectly achieve, I believe a helpful factor is my seven months' experience of working in the makeup industry in London. It makes me quite familiar with the culture and language used in the industry, as will be discussed further in the section on cultural reflexivity.

Transferability is the parallel criterion to external validity (Saunders, Lewis, & Thornhill, 2016). In order to make the reader able to judge the transferability of the study to another setting, I tried to provide a full description of research question, research design, context, findings, and interpretations. It is worth noting that the context of the beauty industry is quite relevant for some of my findings, due to the strong cultural norms surrounding the use of makeup.

4.4.1 Interviewer and interviewee bias

There are two main types of bias which can occur in interviews: *Interviewer bias* and *interviewee bias* (Saunders, Lewis, & Thornhill, 2016). Interviewer bias is when the comments, tone, or non-verbal behaviour of the interviewer affects how the interviewee responds to the questions. This could happen if I tried to impose my own beliefs on the interviewee, for instance. It could also occur in the way I as an interviewer interpret the responses. Interviewee bias, on the other hand, occurs when the interviewee chooses to not reveal or discuss an aspect of a topic which the interviewer wants to explore (Saunders, Lewis, & Thornhill, 2016). This could be caused by the interviewee's perception about the interviewer. However, interviewee bias could also happen if sharing a certain aspect would intrude on sensitive information which the interviewee is unable or unwilling to discuss. The result can be that only a partial picture of the situation is presented, most likely one that casts a socially desirable light on the interviewee or their organisation.

In order to overcome interviewer and interviewee bias I had to consider several factors regarding how I ought to conduct the interviews (Saunders, Lewis, & Thornhill, 2016). In order to have an appropriate appearance for the situation, I decided to wear a semi-professional outfit and makeup look which would not stand out too much from the crowd. Furthermore, I started each interview by explaining to the potential interviewee my background and research, asking for consent to interview them. If they indicated any doubts, I assured them of their anonymity. To avoid bias I also tried to phrase my questions clearly

and in a neutral tone of voice (Saunders, Lewis, & Thornhill, 2016). To reduce the chance of misunderstanding I tried to avoid long questions, and to only use terms that were easy to understand. Rather than focusing the questions on abstract concepts, I asked about the interviewee's own experiences and thoughts.

A final important factor for reducing bias is the appropriate use of different types of questions (Saunders, Lewis, & Thornhill, 2016). I would start the interview with a specific question – I would ask the employees: "How and why does your shop use Magic Mirrors?", and to the customers I would ask: "Have you tried the Magic Mirror in this shop?". These questions functioned as an introduction to the topic of Magic Mirrors. Then I used more open questions to obtain facts and reveal attitudes, for instance: "How would you compare trying makeup virtually in a Magic Mirror versus physically testing makeup?". Probing questions were used to explore further responses that were of significance to the research topic.

4.4.2 Cultural reflexivity and participatory research

Cultural reflexivity concerns the critical reflection on the relationship between the intended research participants and oneself as a researcher (Court & Abbas, 2013). Reflecting on this relationship is important in order to uncover how differing and similar cultural customs might influence the interactions.

From June 2017 until the end of January 2018 I worked as an intern for a major cosmetics company in London. As part of my internship I frequently made visits to various makeup boutiques and assisted at makeup trade shows and makeup shops. Throughout the internship I interacted with many makeup artists, both from the brand I worked for myself and others. I therefore deem myself quite familiar with the culture of makeup boutiques in London.

I conducted the interviews in English, while my mother tongue is Norwegian. This is another factor which could have affected the interactions with participants. I do however have 7 months' work experience in London in the relevant industry, and was deemed fluent in English by the TOEFL Test of English. The language should not therefore not be a bigger hindrance than had the interviews been conducted in my mother tongue.

I tried to have an immersive approach to the locations, spending time simply observing everything that was going on in the shop. This helped me to get used to the location, and it helped the employees get used to me.

When I conducted the interviews, it turned out that some customers came from other countries than the UK, one of them having a different mother tongue than English. I tried then to communicate as clearly as possible and ensure that the questions were probably understood on their behalf, and asked follow-up questions to ensure that I had understood their response.

5. AR-powered Magic Mirrors in makeup boutiques

5.1 The beauty industry and makeup boutiques

In this section I will give a general introduction to the beauty industry and what separates makeup boutiques from other servicescapes. I choose to define the beauty industry as the industry of producing and selling cosmetic products such as makeup, nail polish, creams for skin care, and hair styling products. Cosmetic products have in common that they promise to either improve, change or maintain the way the consumer looks. Therefore, an interesting aspect of the beauty industry in the context of self-augmenting AR technology is that cosmetics are self-augmenting in nature.

Some of the largest cosmetics companies today include L'Oréal, Estée Lauder, and Shiseido (Technavio, 2019). Each company owns several smaller brands. Furthermore, cosmetics are sold in many different places, including drugstores and supermarkets. There are also boutiques which only sell cosmetics from one specific brand, such as Lush stores (Craft, 2019), and chains specialising in selling cosmetics from various brands, like Sephora (Sephora, 2019). Cosmetics are also sold widely online, both via brand-specific websites, and on websites which sell cosmetics from various brands.

For my research I have specifically visited makeup boutiques, that is, shops who sell products from one specific makeup brand. A unique aspect of such makeup boutiques is that the employees who work there are often so-called makeup artists, who serve as beauty experts in addition to their retailing job. They are trained in skincare, makeup application, and colour matching, meaning they can give customers expert advice and also offer services such as in-store beauty makeovers.

All the employees I interviewed had such training and appeared confident in their abilities. I found the idea of introducing Magic Mirror technology to such boutiques interesting, because - in contrast to on web-based shops - expert advice in human form is normally already available, alongside samples of most products.

5.2 Magic Mirrors

Magic Mirrors were mentioned earlier in the paper as a specific type of AR technology. Scholz and Smith (2016) describe Magic Mirror technology as follows:

> Augmenting the space or objects around the user, or even the user himself, with digital objects, typically using public devices such as TV screens that may or may not disguised as normal mirrors. The user can see himself as part of the augmentation, either in direct view in a digital mirror or by watching his actions on a screen from the perspective of a third person (in contrast to the Bogus Window paradigm). (Scholz & Smith, 2016, p.28)

5.2.1 Magic Mirror technology in the beauty industry

Over the last years, Magic Mirror technology has been used by various beauty companies in several different ways, and seems to be growing more and more popular. It is easy to understand why beauty companies embrace this kind of technology. Makeup and hair colouration products can be difficult to envision applied, even when looking at samples in stores. Its usefulness is even more apparent with the growing popularity of online shopping, where physical samples are not available at all. See Figure 5 for a timeline of some of the most important launches in the history of AR-powered Magic Mirror technology in the beauty industry.
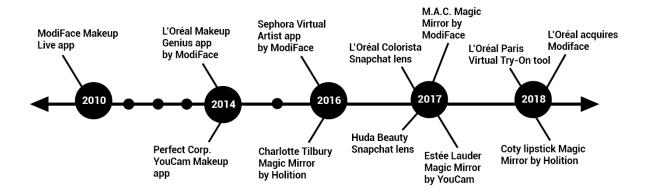

Figure 5: A timeline of important launches in the history of AR in the beauty industry.

Magic Mirror technology has been used by beauty companies in the form of apps, e-commerce tools and as physical "mirrors" in shops (Carman, 2017; Weinswig, 2016; L'Oréal Paris, 2018; Arthur, 2016). Some companies have also made their own custom

lenses for the AR-powered app Snapchat, which has allowed the users of the app to try out the different hair colour shades in the L'Oréal Colorista range (Sampson, 2017), and makeup from the Huda Beauty eyeshadow palette (Singh, 2017).

To my knowledge, the first AR app for virtual beauty makeovers in real-time was Makeup Live by the Canadian beauty tech company ModiFace, launched in 2010 (Business Wire, 2010). ModiFace has since become one of the most important developers when it comes to Magic Mirror technology for makeup, and has created custom apps for major beauty companies such as L'Oréal, Sephora, and M.A.C. (L'Oréal Paris, 2018; Carman, 2017; Haidrani, 2017). ModiFace was acquired by L'Oréal in March 2018 (Clichy, 2018).

Two other relevant AR developers are the UK-based company Holition, which has developed Magic Mirror technology for Charlotte Tilbury and Bourjois (Holition, 2019), and the American company Perfect Corp., which has been highly successful with their app YouCam Makeup and collaborated with Estée Lauder, among others (Parsons, 2017).

5.2.2 Tested technology

Over the course of my research I was able to try several kinds of Magic Mirrors for the testing of makeup. Four of them were in-store mirrors, one of them was made for e-commerce, and one was a smartphone app. See Appendix 2-4 for photos of some of the mirrors. In physical terms, the mirrors differed with regards to size and positioning. Most were made to fit a tablet or smartphone, while one was designed as a full-scale vanity mirror. While the vanity mirror was placed in its own corner, the other in-store solutions were placed together with the makeup samples.

Physical aspects aside, the technology software in the mirrors seemed quite similar. There were some differences however, and from these I have selected some key measures from which such technology can be evaluated and compared. These measures will be described in the following sections. In Table 4 I have put the tested technologies into a simple framework based upon these measures.

Vividness and representativeness

Vividness measures "the ability of a technology to produce a sensorially rich mediated environment" (Steuer, 1992). The concept has been labelled by other terms, such as realism, realness, or richness (Yim, Chu, & Sauer, 2017). Closely connected to vividness is a concept I have decided to call *representativeness* – that is, how representative the virtual product depiction is of how the real product would actually look on the user. While these two factors are related, they do not completely overlap. A product might be depicted in a realistic way in a Magic Mirror, but the colour might still look different in reality. I was informed by an employee in a store with a very realistic mirror that they often had to remind customers that the product might look slightly different in reality.

I was unable to properly test representativeness in the tried Magic Mirrors. Apart from being a time-consuming comparison process, I deemed the samples too unhygienic to test on my face. Furthermore, my research is less about perfectly evaluating the technology, and more about understanding how consumers perceive the technology. I did however get a good impression of the vividness of the various Magic Mirrors, both from testing them myself and from my interviews.

As mentioned in the literature review, studies have found that a lack of vividness will lead to lower perceived usefulness among consumers, by giving them doubts of whether the product would appear the same way in reality (Cehovin & Ruban, 2017). A lack of vividness can therefore seemingly cause representativeness concerns. Vividness also seems to increase immersion, which again leads to higher perceived usefulness (Yim, Chu, & Sauer, 2017).

Assortment

I noticed a clear difference in *assortment* in the different mirrors. By assortment I mean the selection of products available to try on in the mirror. This varied both with regards to how many products were available to try on, and how many different categories of products were available to try on. These factors may influence what purpose the mirror serves best and how customers will decide to use it.

In two of the in-store mirrors I could only try on lip products, although there was a wide array of them to choose from. An employee explained to me that the mirror they had provided an efficient way for customers to narrow down their alternatives from a huge catalogue of products.

Two other in-store mirrors provided products from several different makeup categories. In one of them the selection of products from each category remained quite small. The purpose of this mirror was rather to allow the customer to try out a few specific makeup looks.

Customisation

The mirrors which offered several makeup categories varied with regards to *customisation* possibilities; that is, to what extent the products from the different categories could be mixed and matched by the user. This is a feature which can be useful both in makeup and fashion in order to figure out what products might look good together. It may possibly also create a sense of play for the user.

In one in-store mirror the different makeup products could only be tried on as part of ten pre-made makeup looks. Another in-store mirror, and an app, both however allowed free mixing and matching of the different products.

Real-time or static image

According to the Azuma et al. (2001) definition, AR technology should "run interactively, and in real time". Some mirror-like try-on technologies do however not run in real-time. Instead, the user augments a static photo of themselves. For instance, the virtual mirror in the study by Cho and Schwarz (2012) was constructed from a static image. The try-on app at YSL's shop did the same; when using the app, I first had to take a selfie with the iPad which I then could augment with virtual elements. This did of course make it feel less like a mirror than the other solutions did, and could possibly reduce the feeling of realism and interactivity of the tool. However, it also reduces the chance of experiencing possible glitches in the technology due to the need for face detection while moving.

The L'Oréal Paris e-commerce try-on tool and the YouCam app offers both options. The user can choose between augmenting their reflection in real-time, or to upload a selfie to augment. In the YouCam app, the user can save their augmented selfies to share on social media.

	Vividness	Assortment	Customisation	Real-time or static
Charlotte Tilbury (in-store)	High	Several categories, limited options	Not possible	Real-time
Estée Lauder (in-store)	Excellent	One category, many options	Not possible	Real-time
Tom Ford (in-store)	Excellent	One category, many options	Not possible	Real-time
YSL (in-store)	Good	Many categories, many options	Free customisation between categories	Static
L'Oréal Paris E-commerce	Good	Many categories, many options	Not possible	Both available
YouCam Makeup app	Excellent	Many categories, many options	Free customisation between categories	Both available

Table 4: A framework for evaluating digital try-on technologies

6. Results

In this section I will present my findings. I will first discuss technology adoption from a firm and customer perspective. This will allow me to show the benefits offered by this kind of technology, and why companies invest in it. Then I will move on to the main part of my findings, which is about the technology interaction with customers after adoption. This will allow me to answer the research question of how and why this kind of technology affects consumer experiences and attitudes. I will present my theoretical propositions at the end.

6.1 Technology adoption from the firm's perspective

Although managers tend to adopt Magic Mirrors for the reasons described in the TAM model, the reasoning by employees demonstrates a strong future orientation.

6.1.1 Expectations of future attractiveness for customers

In-store Magic Mirror technology is quite a new phenomenon, which as of yet has only been rolled out to a few shops. The employees of these shops whom I interviewed expected the popularity of such technology to grow, however. One employee stated the following:

> *More technology like this will come. It's all about creating a retail experience.*

Experiential retail has been widely discussed as a way to combat the increasing popularity of online shopping. One of the customers I interviewed worked as a retail designer, and stated that "You need AR to stay on top of retail".

Another employee talked about increased trust from customers in the future:

> *Technology like this will get better and better. It will gain more trust from customers as the technology gets more realistic.*

As mentioned in my literature review, a perceived lack of realism in AR-based try-on technologies has been shown to cause doubts among participants as to whether the products would look the same way in reality (Cehovin & Ruban, 2017). The employee is therefore

likely to be correct that increased realism will raise trust among customers when using the technology.

6.1.2 Expectations of future usefulness

Several employees shared a belief that the technology could become more useful in the future by being able to perform more tasks, as one employee described:

> *If the technology gets really good, it might be able to analyse faces and apply makeup more accurately and individually as it suits the customer's face.*

Another employee shared similar thoughts:

> *In the future, Magic Mirrors might be able to map the customer out completely, telling them what shades will look good on them and what makeup looks would suit them.*

These improvements would make Magic Mirrors able to perform many of the tasks that only a beauty expert can do today. Most employees however seemed quite adamant that their role would not be affected by the Magic Mirrors. This could be out of a defensive attitude, but they also seemed to share a strong faith in the importance of human connection, something a Magic Mirror cannot offer.

6.1.3 Expectations of future ease of use

There were also ideas on how the technology can be improved to simplify the whole shopping process for the customer, as one employee stated:

> *[In the future] it could give complete product recommendations, even send them directly to cart or for the customer to pick up in store.*

Currently, the customers would often need help from the employees to find the product they were looking at in the Magic Mirror. This affects how easily the customers can use the Magic Mirror as a useful tool in their shopping process.

In conclusion, it is quite interesting that companies invest in this kind of technology hoping that it will get better and be worth more in the future. This is the opposite expectation of most other investments, where the asset value decreases over time. The employees seemed quite aware that the technology is not yet perfect, but believed there was great future potential.

6.2 Technology adoption from the customers' perspective

Next I will present what I found to be the reasons for technology adoption among customers, as well as what I found to be potential hindrances for technology adoption. As my data show, these reasons are in line with the extended TAM model.

6.2.1 Perceived usefulness

In the context of the Magic Mirrors, perceived usefulness implies hygienic benefits, a more efficient shopping process, and that the technology offers relevant product information. One employee explained the following to me:

> *Customers are often uncomfortable with trying out lipsticks from samples, as it is not seen as hygienic.*

Often customers resort to testing lipstick samples on the back of their hands to avoid getting an unhygienic product on their lips. In a Magic Mirror however, the customer can try on lipstick shades without even touching the samples. Several brands appear to have realised the usefulness of this. As mentioned before, two of the mirrors I tested were only for the testing of lip products. Other brands have employed such mirrors as well, such as the Bourjois boutique in Paris (Baron, 2018).

Furthermore, both employees and customers told me when being interviewed that the Magic Mirror added a useful step in their shopping process, as exemplified by the following customer quote:

> *I think it's a good place to start before trying makeup in real life, to see what products might look good on me.*

Interestingly, the employees shared more or less the same thoughts on why customers use the Magic Mirror, as one employee said:

> *It is a good way for customers to experiment and try on new looks before trying them out in real life on their own or with a makeup artist.*

It seems paradoxical that adding an extra step to a shopping process is deemed to be useful. However, it does make more sense when taking into account the large assortment of products offered by these brands. As mentioned, two of the shops I visited had mirrors made specifically for trying on lip products. Among their assortment of lip products, both brands have several hundred different shades to choose from. Employees in these shops stated that the Magic Mirrors made it easier for the customers to quickly try the different lip shades and find the ones which suit them. In this way, adding an extra step can in fact be time-saving for the customer, and help them narrow down their choices when the assortment is overwhelmingly large.

The customers I spoke to did not think that this "extra step" could replace the original step of testing the real makeup samples, however. This was due to the fact that certain types of information about the products were not obtainable from the virtual testing, as explained in the following customer quote:

> *Trying on makeup virtually only gives you an impression of the colours and how the makeup will look on you, but it says nothing of the consistency or quality of the products.*

Another customer shared similar thoughts:

> *One has to try the makeup in real life to know exactly what it's like. It's not only about the product, but also how it works together with one's specific skin type.*

While we can conclude that the technology is perceived to be useful, there are aspects which limit the extent to which it can be useful at this moment in time. As discussed, there is a hope and an expectation that the technology will become more advanced in the future, so these limitations may only be temporary.

6.2.2 Perceived ease of use

Perceived ease of use in this context implies that the technology is easy to navigate, that the users do not experience any challenges with using technology in the intended way, and that it is easy to find necessary product information.

The Magic Mirror technology felt quite familiar to me, in that it was similar to the selfie camera on a smartphone, but with options which affected my reflection. I observed customers in different ages interact with it – from teenagers to elderly ladies. None of them looked confused as to how to use it.

This does not mean that using the Magic Mirror was completely "free from effort", however. Glitches sometimes happened, where the mirror was unable to properly detect the user's face. In one shop I observed a customer struggle when using the Magic Mirror due to her glasses, which made it difficult for the mirror to properly detect her eyes. A male employee in the same shop shared with me a similar detection issue caused by his beard:

> *I have a beard, and because of this the mirror registers my lips to be bigger than they actually are, so it looks comical.*

While such detection errors can lead to comical and entertaining results, it may also cause difficulties in using the technology in the intended way, which could be frustrating for the customer over time.

As mentioned in the section about the firm's perspective, the process of obtaining a product which one has tried in the Magic Mirror is not as simple now as it might become in the future. One customer made the following statement:

> *[The magic mirror] was easy to use, but I was annoyed that I needed to ask staff about which products I was trying.*

This comment was made about a Magic Mirror which did not show the names of the products the user was trying on the screen. Other mirrors did do this, but the employees in these shops informed me that customers would still often ask them for help to find a product they had tried virtually.

6.2.3 Joy

During my observations and interviews, I found many examples of how the Magic Mirrors sparked joy for the consumers who tried it. The mere aspect of simplifying an overwhelming shopping process could spark joy on its own, but there was more to the joyful experience than usefulness. There is also a social dimension, as described by an employee:

> *They think it's really fun, they giggle and take photos. They are typically a group of friends, but they also sometimes try it alone.*

Another employee shared a similar statement:

> *They try it both alone and in groups, and have a lot of fun when trying it together.*

I also observed how the social aspect of trying the Magic Mirror sparked joy. One key observation was a family of grandparents, parents and grandchildren who all tried one of the Magic Mirrors together in a shop. They all smiled and laughed, expressing enjoyment.

6.2.4 Curiosity

Curiosity can also be important in the process of technology adoption, and was a relevant factor for why customers chose to approach the Magic Mirror. One employee stated:

> *Customers are curious when they see it – not all of them know what it is. They love it when they try it.*

One customer told me the following after I asked her why she approached the Magic Mirror, where her curiosity was sparked by seeing me try it with another customer:

> *I got curious about the mirror after seeing you and the Canadian lady using it.*

If technology like this becomes more common in the future, this novelty factor may diminish, and Magic Mirrors may not spark as much curiosity as they currently do. It is therefore important that the technology does not solely rely on novelty and gimmick factors to attract customers.

6.3 Beyond initial use

The process of adopting the Magic Mirror technology was quite rational and easily explicable with existing models for technology acceptance. Customers perceive the technology as both useful and relatively easy to use, and it sparks both joy and curiosity. Along with seeing the technology as useful for customers, firms invest in the technology in order to improve their retail experience. The employees believe that such technology will get better and more popular in the future.

The way consumers behave with the mirrors after adoption however, is harder to explain in such a straightforward manner. In particular, I found that consumers would do things in the Magic Mirror which they would be hesitant to do, or even abstain from completely, in "real" reality. More concretely, I found that women would try on rather unusual products such as bright green lipstick, and men who would normally never even touch makeup would try dramatic makeup looks in the Magic Mirror. It is interesting that this is accepted as normal and accepted behaviour in a Magic Mirror, while both actions would likely cause a stir on the average workplace if they happened in our real environment.

The firms' intentions and expectations when investing in this kind of technology are practical and optimistic. Usefulness and experiential value are in focus, and employees are confident about future improvements. There is an interesting contrast between this attitude and the more complex ways in which I found the technology affects consumers. The intentions do not entirely match the outcome. There are in fact potentially unfavourable consequences of using this kind of technology, as I will get back to later.

In the rest of my Results section I will present and explain my findings about the user behaviour I observed after technology adoption. This will allow me to answer my research question.

6.3.1 Experimenting with the self

One of the most interesting findings of my research has to do with an increased willingness among customers to experiment with makeup virtually in ways they would not normally have done. Employees in two of the shops reported that the Magic Mirrors made customers

more comfortable with trying on makeup looks they would be afraid to try in reality. This is illustrated by the following quote by an employee:

> *The mirror makes it easier for some customers to try on extreme looks and products, such as red lipstick. Some customers are terrified to try red lipstick on, even though it can be easily wiped off.*

An employee in another shop shared something quite similar:

> *Sometimes a customer comes in wanting to try a new lipstick shade, but are wary to try it on their lips. This is a useful tool to let them experiment.*

I experienced this effect myself when trying the YSL Magic Mirror, which allowed me to virtually colour my hair bright pink – a change far more drastic than I would have been comfortable with trying in real life. Being able to try it in the Magic Mirror made me feel excited. The app reminded me of the dress-up games I used to play as a child. I observed a similar behaviour among vloggers testing Magic Mirror apps. In one vlog, a group of male and female reporters tested a Magic Mirror app on a tablet, and ended up excitedly trying various unusual hair colours on each other. Another vlogger appeared exhilarated that she could try on coloured contacts and green lipstick in the app she was trying, exclaiming:

> *Lipsticks… Oh let's do a crazy colour. Oh green! I feel like a mermaid.*

This is likely one of the strategies which has made Snapchat so popular. The app always offers new and entertaining AR filters which transform the user's face in unexpected ways.

The sense of play that I observed and experienced myself is described well in the following employee quote:

> *Customers find [trying the Magic Mirror] fun and exciting. There is an almost childlike demeanour that comes over them. They try it both alone and with friends. Men often try it too while waiting for their wives or girlfriends.*

The quote mentions another interesting phenomenon: Sometimes men decide to try the Magic Mirror in the makeup boutiques. This was mentioned by several employees, but is illustrated particularly well by the following statement:

Young and old men try on makeup in the Magic Mirror while waiting for their wives and girlfriends. They would never try on makeup in real life, and are sceptical when arriving in the shop. But the mirror sparks their curiosity, and they start clicking away. There is no commitment involved.

If this happened only among men in shops waiting for their wives or girlfriends, one could argue that it was just a way of passing the time, and that the men were drawn to the Magic Mirrors out of a curiosity about the technology. However, my vlog data suggests that there is something more going on. Videos of men playing with makeup in Magic Mirrors were easy to find – and in none of these was the man waiting for his wife. There were videos of men trying Magic Mirror apps in their homes, as well as larger Magic Mirror instalments in a shop and at a convention. There were videos of men trying the Magic Mirrors both alone and with colleagues. "Play" is a key word here. In none of the videos was there an apparent goal for the man to find a product to purchase. Rather, they tried out products for fun, and made faces and jokes.

Although contemporary cultural norms tend to grant the right to use makeup only to women, there are men who wear makeup too. I met several male makeup artists who wore makeup on a daily basis during my time working in the beauty industry. I concluded however that the men in the mentioned vlogs did not normally wear makeup, due to the fact that they did not wear makeup in their other videos and the rest of their content was not centred around makeup.

These findings point towards the idea that men who normally never wear makeup have a desire to try it. Although they would abstain from doing so in reality, the Magic Mirrors allow them to explore their curiosity. This appears to follow the same pattern as how existing makeup users are willing to try on colours and shades in the Magic Mirror which they would be wary to try normally.

This leads me to three key questions: Firstly, where does the desire to experiment with one's appearance come from? Secondly, why are some consumers opposed to experimenting with their appearance in certain ways in mundane life? And finally, how does the AR-powered Magic Mirror relieve this opposition?

6.3.2 Experimenting with the self in real and argumented realities

In my literature review I described how dress has been a way of communicating identity throughout history. Appearance and identity are closely related, and influence one another. Consumers may use their appearance as a means of expressing and communicating their identity, and in this way identity influences appearance. Appearance may also affect identity, however. We are born with certain physical traits which are difficult to change, and these traits may influence both how others perceive us and how we perceive ourselves.

Instead of being bound to one very specific appearance or identity, consumers modify their appearance and behaviour in different settings of their life. They are in a sense switching between multiple related identities: a strong leader at work, a caring mother at home, and a social butterfly at parties, for instance. Consumers often enjoy experimenting with identity and appearance, which is illustrated by the popularity of Halloween, theatre, costume parties, and cosplay events. Similar to a Magic Mirror, events like these facilitate a desire to play with appearance and identity in ways which are not accepted in everyday life. As mentioned in the literature review, consumers may also experiment with their appearance and identity to come closer to an ideal self, and reduce the discrepancy between that and the actual self.

My research mostly deals with appearance-centred experimentation, but as appearance is so closely connected with identity, I do not wish to separate them. For the sake of simplicity, I will from here on use the term *self* to refer to appearance and identity, and *experimenting with the self* to refer to experimentation with appearance and identity.

If consumers abstain from acting on a desire to experiment with the self in the real environment, there must be something holding them back which changes when a Magic Mirror is introduced. In order to explain this effect, I will revisit the Elster model of Action. In the model, the consumer's actions will be shaped by their desires, emotions, and beliefs (Elster, 2009). The beliefs can in turn be influenced by information held by the consumer.

If a male consumer has a desire to experiment with makeup but abstains from doing so, the desire must not be accordance with either his emotions or his beliefs, or both. The man might have a belief that wearing makeup is feminine and not something a man should do. He might also have a belief that wearing makeup might cause him to be met with ridicule. This belief may in turn cause an emotion of fear related to the action of wearing makeup. Experimenting

with makeup becomes an irrational consumer choice when the consumer believes that doing so would be wrong and fears that it would be met with mockery, even if the desire is there.

A female makeup customer may face similar beliefs and fears regarding wearing an unusual and bright lipstick colour. She might believe that such a makeup choice does not fit with who she is as a person, and fear that it would be met with negative attention. For less extreme choices such as bright red or orange lipsticks, she might simply hold a belief that such colours do not suit her and fear that people would think she looked ridiculous.

In both of the examples above, the beliefs and emotions which would normally stop the consumers from self-experimenting are likely to have been shaped by culture and norms in the society and communities in which these consumers take part, as well as by personal experiences.

The dynamic I have described may lead to some degree of cognitive dissonance. There is a desire to do something, but it feels wrong, and there is inner conflict. My data suggests that a Magic Mirror can relieve this dissonance.

Consumers abstain from acting on a desire when it is not in accordance with their beliefs and emotions. AR-powered Magic Mirrors must therefore moderate beliefs and emotions so that consumers start experimenting with the self. The moderating effect makes the beliefs and emotions come into accordance with the desire, and the cognitive dissonance disappears. The choice which before was irrational thus becomes rational within the realm of AR. This indicates that the consumer has separate rationalities, or separate systems of preferences, in the Real Environment and in AR, and that such different systems can co-exist at different points in the Reality-Virtuality continuum.

The Magic Mirror effect

As mentioned in the literature review, identity tourism has been observed widely on completely digital platforms such as internet forums and multiplayer games (Nakamura, 2001). However, these platforms are somewhat different from AR: On internet chat rooms and video games, nobody – apart from hackers - can see who the user truly is. This gives the user complete freedom in choosing whatever identity they might want, no matter how far it might be from their actual gender, ethnicity, or appearance. This makes it possible to experiment with the self in nearly unlimited ways. As these platforms in a sense offer web-

based societies and worlds, the user can enjoy this different self over time, or even a plurality of shifting selves through several different avatars (Wilson, 2003).

AR however is just a virtual layer over reality. Unlike a video game, AR technology does not take the user into a different world, but augments the one they are in. It disconnects the user from reality to some extent: the changes do not happen in the physical environment, but only on a screen. They happen instantaneously, only to a virtual reflection, and for now; they happen only temporarily. Differences aside, completely virtual platforms and AR platforms seem to have in common that they allow the user to disconnect from the real environment.

When presenting the examples of such behaviour from my research, I concluded that the beliefs and emotions which normally hold a consumer back from experimenting with the self are largely shaped by the culture and norms in the society and communities they are part of. If the Magic Mirror disconnects the user from the culture and norms of their mundane life, this would largely explain the change in beliefs and emotions. Like Halloween, the Magic Mirror offers different norms for how people should behave and thus facilitates experimenting with the self. This can be extended to the rest of the Reality-Virtuality continuum. Different platforms throughout the continuum offer the opportunity to abandon the norms of the real environment, or to develop alternative norms. The consumers' beliefs and emotions adapt thereafter.

Another factor which influences how a consumer experiments with the self at any point in the Reality-Virtuality continuum is the *pool of possibilities* available. In the Magic Mirrors, this can be exemplified by the differences in customisation freedom and assortment of the digital try-on technology. In the YSL mirror I was able to change nearly every part of my appearance and combine different options freely, while in the Tom Ford and Estée Lauder mirrors I could only see myself with different lip products on. The Charlotte Tilbury Magic Mirror was restricted to ten different makeup looks, while the YSL Magic Mirror and the YouCam Makeup app allowed me to experiment with and combine an extensive assortment of different options. The consumer is therefore likely to experiment more in a Magic Mirror when there are more options for doing so.

This can be extended to different platforms throughout the Reality-Virtuality continuum. There is a certain pool of possibilities to change ourselves in physical reality, and others on completely virtual platforms, for instance. While the pool is likely to be larger in virtual

worlds, there are many more possibilities in the real environment than most consumers take advantage of. Once again, this is mostly due to culture and norms.

Even when given the same pool of possibilities and the same culture and norms, different consumers will still experiment with the self differently, due to differences in preferences. One blogger said the following while switching between various costume makeup looks:

> *That one's not [a good look]. Dark lipstick – not my thing. *changes to a feline costume makeup look* Being a cat, however – totally my thing.*

The stability or fluidity of the consumer's identity may also influence the degree to which they desire to experiment with the self. That is, some consumers may feel so certain of who they are that there is little curiosity in exploring something else. Other consumers may feel more fluid in their identity and be eager to experiment with the self in various ways.

6.3.3 The liminal self

If consumers have separate rationalities regarding experimenting with the self at different points of the Reality-Virtuality continuum, they might end up constructing different selves at different points of the continuum. I discussed the concept of a plurality of shifting selves in relation to video games and avatars (Wilson, 2003). One could imagine a similar plurality of shifting selves at different points of the Reality-Virtuality continuum, separated by different rationalities.

In video games the player can create avatars which look completely different from themselves. In those cases, the differences between the two selves – the player and the avatar – may be so obvious that the user can easily differentiate between them and not feel like one affects the other. As was mentioned in the literature review however, players may also design avatars to be something closer to their ideal selves than the players themselves are (Bessière, Seay, & Kiesler, 2007). Going back to self-discrepancy theory, one may say that the avatar allows them to reach an ideal self which is harder to reach in reality.

There are many ways of constructing the self on digital platforms. In my shorter interviews on technology habits I interviewed an Instagrammer with several thousand followers, who stated the following:

I only posts photos that fit the specific identity of my Instagram account, and I feel like the other sides of me must go somewhere else.

This quote epitomises a lot of behaviour on social media platforms. In such cases, users may experiment with the self on a platform where they represent themselves, simply by selecting photos that fit a certain aesthetic and holding back what does not fit. This is however not so different from what we already do in our everyday, non-digital lives, where we may adapt both our appearance and our behaviour according to where we are and who we are surrounded by. One significant difference with digital platforms is the level of control we have over our appearance. Through various apps one's appearance can be changed in both subtle and extreme ways.

Another respondent of my interviews on technology habits shared with me something she experienced as a consequence of using smartphone apps for editing her selfies:

I have almost not posted any selfies on permanent platforms in a while because of dysmorphia. (...) I got such a warped idea of my face that it always looked slightly wrong when I passed a mirror.

She elaborated on how this happened:

Just enough editing and the right posing contributed to shape this idea of what my face should look like. I wished almost constantly that I could just shapeshift myself to look "right" – a bit taller, a bit thinner, a narrower face, larger eyes and so on.

It appears that this respondent gradually brought her physical self to her ideal self, but only within the liminal space of the augmented reality. However, exposure to this augmented self made it feel more real than her physical self, making her true physical appearance seem wrong.

The interviewee's experience is not an isolated event. In fact, one of the employees in the makeup boutiques I interviewed made me aware of this as a larger phenomenon, saying:

I feel sorry for young people growing up these days. Some of them get Snapchat dysmorphia and get plastic surgeries to look more like they do on Snapchat.

The term *Snapchat Dysmorphia* was coined last year and describes a new tendency observed by plastic surgeons (Rajanala, Maymone, & Vashi, 2018). Previously customers would bring photos of celebrities to plastic surgery consultations, while there now is a trend of patients seeking out cosmetic surgery to look like filtered versions of themselves instead, with features such as fuller lips, bigger eyes, and a thinner nose. The filtered selfies often present an unattainable appearance. Many of the filters come from the app Snapchat.

This indicates that when a consumer actively starts using AR or AV to reduce the discrepancy between the actual and ideal self, it may eventually cause a shift in the consumer's idea of how they actually look. Applying self-discrepancy theory, we may say that the consumer's self-concept has shifted, away from the true physical self. Instead of a separation of the self, the mind of the consumer reduces the discrepancy between the actual and ideal self by pushing the self-concept along the Reality-Virtuality continuum, away from the real environment. This may only be the self-concept related to appearance, although appearance and other identity attributes are closely interconnected and difficult to fully separate.

For this effect to happen, the consumer must have a discrepancy between their own standpoint on the actual and ideal self, and a motivation to reach a state where their actual self matches their ideal self. Virtual ways of augmenting the self may then influence the mind to think that the discrepancy is being reduced, although the changes that make it so are not transferred to physical reality.

In my literature review, I presented the concept of liminal space in the context of projective identity between the player and the virtual avatar in video games (Waggoner 2009). The concept is also relevant when studying the self in the Reality-Virtuality continuum. Between the physical self and the virtual self, there is a self which is neither fully physical or fully virtual. This is either a virtually augmented physical self, or a physically augmented virtual self. Both of these exist in the threshold between the fully physical and the fully virtual self. We may call this the *liminal self*, and I have illustrated it in Figure 6 below.
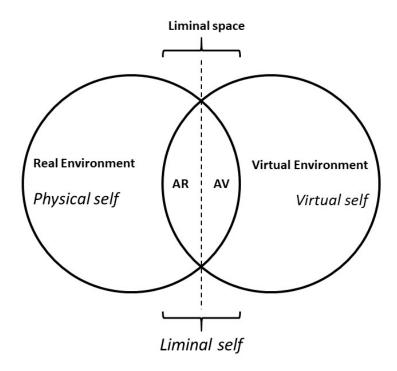
Figure 6: The liminal self in the Reality-Virtuality continuum

The threshold of the liminal space may cause one's "real" self to feel ambiguous, and if the consumer is heavily exposed to a liminal self, this might cause disorientation and dysmorphia as the interviewee described above. Current technological developments allow consumers to explore liminal selves which are closer to their ideal selves. This is worth considering, especially since consumers relate to these augmented reflections in a different way than they traditionally would with normal mirrors.

Traditionally, one looked in the mirror to put on makeup and fix one's hair, and then the mirror was left behind. We augmented ourselves for others to see. In a Magic Mirror, we are the only ones seeing the augmentation, unless someone stands next to us or we share a photo of it with someone. There is a sense of narcissism in this behaviour, and I observed some almost addictive tendencies in vlogs about Magic Mirror apps with large assortments. The vloggers would excitedly be flicking through look after look, always eager to see a new one. A female blogger worded it in a particularly interesting way:

> *Playing with the different colours was strangely compulsive, like flicking through Tinder matches.*

As one may look for the perfect match on Tinder, it appears that these users were looking for something in the pool of possibilities. They may have been driven by a motivation to find the augmentation which brings them the closest to their ideal self.

This is all relevant due to something I became aware of during my research: the reflection the user sees in the Magic Mirrors is not necessarily a representative and realistic image of the user's actual appearance. In one of the shops, an employee stated the following about their Magic Mirror.

> *It looks like you have a beauty filter on, so your skin looks much better than in reality.*

From my own testing of this particular Magic Mirror, I agreed that the skin was smoothened out in a way which could hardly be achieved with makeup. This was not the only Magic Mirror solution with the potential of manipulating the user's face unrealistically. In a vlog where several users tested an app-based Magic Mirror, one user stated the following:

> *I think this thing makes you look prettier than you really are. It smooths your face out.*

An employee in a different makeup boutique shared the following with me:

> *A while ago we realised that in the settings it is possible to adjust how the user's face will appear on the screen: how even the skin is, how broad the jawline is and how big the eyes are. I'm not sure if it's still possible.*

Why are shops doing this? As mentioned in the literature review, research shows that consumers evaluated a product more favourably the more they liked the static image used to construct a virtual mirror (Cho & Schwarz, 2012). Factors that were shown to make the consumers like their image more included a happier facial expression, and visual enhancement for improving the skin condition. The effect can be explained by the Elster model. Seeing an attractive image or reflection of yourself may create a positive emotion on its own. Seeing this attractive image or reflection when trying a certain product may also lead to a belief that the product will make you more attractive. This emotion-belief combination may make the consumer more likely to act and purchase the product. If the consumer knew their face was being manipulated however, the belief of the product's

positive effect on attractiveness might be shattered. Nevertheless, adjustments like the ones mentioned above are often not easily discernible to the customer.

At least two of the employees I spoke to were well aware of Snapchat dysmorphia and expressed worry for young consumers. One of them stated:

> *I am worried about how AR technology can make us too obsessed with perfection.*

My findings support this as a valid concern. I will debate it further in the Discussion section.

6.4 Propositions

Based on the analysis above I have developed the following set of theoretical propositions:

1. The more virtual the environment is, the more disconnected from the cultural norms of the real environment the users will be, and the more their system of preferences within the augmented or virtual environment will differ from the system of preferences in the real environment.

2. The more conflicting the desires and beliefs are in the real environment, the higher the consumer's motivation will be to act differently in AR.

3. The more conflicting the desires and beliefs with regards to the self are, the more likely the consumer is to self-experiment in AR, in order to relieve cognitive dissonance.

4. The larger the pool of possibilities on an AR platform, the more the consumer will experiment with the self.

5. The larger the discrepancy between the consumer's own standpoint on the actual and ideal self, the more likely they are to pursue their ideal self in AR.

6. The more a consumer is exposed to a liminal self which falls between their real and ideal self, the more likely their self-concept is to shift towards this liminal self.

7. The closer AR brings the consumer to their ideal self, the faster they will adopt the technology.

7. Discussion

In my discussion section I will present my theoretical contributions and managerial implications for the present and the future. I will describe how managers may take advantage of my findings, but also how to use AR technology in an ethical and responsible way. I will also discuss the limitations of my research.

7.1 Theoretical contributions

In my literature review I presented existing research on AR in retail and digital try-on technologies. This research focused mostly on factors such as purchase intention, product and technology evaluation, and perceived usefulness. There was also some research on how the technology influences store atmosphere and how the atmosphere influences the consumer when using the technology. There was little research however on how the technology affected consumer experiences and attitudes on a deeper level and beyond the initial intention to try a new product. I believe it is important to fill this gap if this this kind of technology is to become an increasingly large part of marketing, retail, and e-commerce. This will help companies employ the technology more effectively and more responsibly.

I found that firms adopt technology like this largely out of rational reasons. Employees recognised its usefulness in the form of simplifying the customer's shopping process, hygienic benefits, and experiential value. They believed the technology would improve in the future and gain more trust from customers. The customers I interviewed shared similar thoughts about usefulness, and joy and curiosity were important factors for adoption. The initial adoption stage of the technology was easily explicable with the extended TAM model.

What I found about technology adoption from the firms' perspective was interesting however, due to the contrast between current evaluation and future expectations. The employees I talked to were aware that the technology was not yet perfect, but expected it to greatly improve and grow in popularity in the future. Normally companies invest in new assets expecting it to provide benefits now, and that the value will depreciate over time. Although the reasons for adoption are in accordance with a common model, they are largely about future value instead of current value. In this regard one may compare Magic Mirror technology to a disruptive innovation.

My main theoretical contributions concern what happens beyond initial use, where I found usage patterns of a more complex nature. These involved mainly the increased willingness to experiment with the self in ways one would abstain from in reality, and the desire to pursue an ideal self, where the latter may shift one's self-concept if the exposure to the liminal self is high. The two sets of behaviour patterns are driven by similar internal conflicts; cognitive dissonance and self-discrepancy. Both of these states cause discomfort for the consumers, and AR can help reduce it, temporarily.

Some consumers abstain from experimenting with the self in certain ways in the real world because of cognitive dissonance caused by a conflict between desires and beliefs. In the examples I found of such cognitive dissonance throughout my research, the beliefs were mostly derived from culture and norms from the real world, regarding who should wear makeup and what kind of makeup is acceptable.

According to cognitive dissonance theory, a consumer will be motivated to try to reduce the dissonance in order to function in the real world (Festinger, 1957). To do so the consumer would normally need to go through certain steps, such as changing a behavioural cognitive element or adding new cognitive elements. My research contributes to cognitive dissonance theory by showing how such steps are not needed in AR. This does make sense as AR is not the real world, but it is much closer to the real world than virtual video games. It means that cognitive dissonance in the real world can be relieved by adding a virtual layer on top of it. AR moderates the beliefs by disconnecting the user from the norms of the real world, and thus the cognitive dissonance is relieved. In this manner, an action which is irrational in the real world may become rational in AR. This indicates that the consumer can construct and maintain distinctive systems of preferences which co-exist at different points in the Reality-Virtuality continuum.

My study contributes to self-discrepancy theory by demonstrating how consumers can reduce the feeling of discomfort caused by a discrepancy between the actual and ideal self temporarily by the use of AR. This happens when AR shows the user an augmented version of themselves which is closer to their ideal self. The augmentation does not transfer to physical reality, however, which causes dysmorphia among some consumers. I contribute further to self-discrepancy theory by proposing that this type of dysmorphia is caused by the consumer's self-concept shifting closer to the augmented self. It is likely that dysmorphia occurs due to the liminal nature of AR. When one augments the self in AR, one constructs a

liminal self which is not fully physical or virtual, causing a feeling of disorientation. For this effect to happen, the pool of possibilities in the AR platform must have options or functions which bring the user closer to their ideal self. I will debate the ethics of this under Managerial Implications.

My study adds an interesting dimension to both cognitive dissonance theory and self-discrepancy theory. Through the use of AR, the consumer can reduce emotional discomfort caused by inner conflict. As the technology is now, however, our augmented selves are only temporary and mainly seen by ourselves only. This may change in the future, as I will get back to later.

7.1.1 Experimenting with the self and comfort

Previous research on the Magic Mirror app Sephora Virtual Artist found that the atmosphere of the home allowed consumers to interact with the app in a way that felt supportive of experimenting with the self (Scholz and Duffy, 2018). My research indicates that the atmosphere of the home is not necessary. The nature of the technology itself is in fact enough to make customers comfortable with experimenting with the self even in shops where they are surrounded by employees and other customers. AR creates a liminal space which disconnects the user from the real surroundings and makes the user more comfortable with experimenting with appearance. This is true even when strangers are nearby, as it is commonly understood that AR is not real, and that experimenting in unusual ways in AR is done for the sake of entertainment.

It is possible that AR increases the acceptance of unusual ways of experimenting with the self both initially and afterwards. If a consumer gets used to seeing their own appearance changed in unconventional ways virtually, the more they may accept unconventional appearances in the real environment.

7.1.2 Measurements for Magic Mirrors

Before introducing my findings, I presented some measurements for Magic Mirror technology. These included vividness, representativeness, assortment, customisation, and

real-time versus static reflection. My study contributes to existing theory on Magic Mirrors by offering this framework of measurements by which different applications of such technology can be evaluated and compared. Below I will discuss how differences in these measurements affect consumer experience and attitudes, according to my findings.

Assortment and customisation make up the pool of possibilities of the AR platform. The number of options and categories, and the freedom the user has in combining them as they please, determine the degree to which the user can experiment with the self. While this may not be surprising, it is worth being aware of how the design of a digital try-on technology will affect how consumers use it. In their desire to experiment with the self, consumers seem to enjoy unusual and fun assortment options, which often spark excitement.

The representativeness factor will directly influence the usefulness of the Magic Mirror as a tool for finding the products which will suit the customer best, and my data indicates that customers will use Magic Mirrors for this purpose. It is not something the customer will be able to judge very well until they receive the physical product, however, unless they already own it.

In existing research, vividness has been shown to improve perceived media usefulness by increasing immersion (Yim et al. 2017), and a lack of realism was shown to reduce perceived helpfulness of the technology due to creating doubts regarding whether the products would appear the same way in reality (Cehovin and Ruban 2017). It is likely that the more realistic a liminal self is, the more likely the user's self-concept is to shift towards it, as a high level of realism makes it hard to separate from the real world. A low level of realism would on the other make the user less likely to experience this shift in self-concept.

In a similar manner, a static reflection may be less likely to cause a shift in the self-concept than a real-time reflection, as it feels more similar to a real mirror reflection. However, the interviewee who had developed dysmorphia experienced this as a result of exposure to static, augmented pictures of herself, and the degree of exposure may be the most important factor. Static images have one benefit in that they are better guarded against glitches caused by poor detection. Some of the real-time Magic Mirrors appeared to sometimes struggle with detecting the face of the user properly, leading to comical results or the virtual makeup disappearing. This is usually avoidable with the static image, in which the user adjusts

"dots" to specify where their eyes and mouth are. It is likely that a real-time reflection will increase immersion as long as detection works well, however.

7.2 Managerial implications

AR technology is developing quickly, and future innovations may open up for completely new ways of using it. I wish therefore to offer managerial implications from my findings which are relevant presently, but also offer some insights into potential future developments and how my findings would be relevant for them.

7.2.1 Implications for the present

There are many rational reasons for managers to invest in AR technology. It can offer experiential value in a servicescape, and be a useful and hygienic tool for the virtual testing of products. It is important to be aware however that such technology also has the potential to influence consumers in more complex ways. This can be good when used right, but also have unfavourable effects on consumer when abused.

To improve initial adoption of the technology it is beneficial to focus on sparking curiosity and joy, as well as communicating usefulness. To encourage continued use, the technology should allow for experimenting with the self, self-exploration, and play.

AR facilitates experimenting with the self, and there are several benefits to this. AR makes it less scary for customers to try on new and different ways of changing their appearance. This gives the customers the opportunity to loosen up and play, and to express themselves in new ways. In a culture where people keep being told to be themselves, but may be scared to do so, AR may be a good place to start. In other cultures, where it is not accepted to be oneself, AR could give consumers a taste of what it is like, and allow them to play out their dreams virtually.

More experimenting with the self can be made possible by expanding the number of assortment options and categories, and the degree of customisation freedom between them. Fun and unusual options can be included to increase excitement.

Although I focused on the makeup industry in my research, facilitating experimenting with the self could be useful for any industry where the appearance of the customer or their surroundings will be changed. For Magic Mirror technology this could include hair salons, barbers, and fashion boutiques. By using a similar kind of technology to IKEA Place, it could also be taken advantage of by interior shops and garden centres.

Furthermore, my findings suggest that it would be beneficial for companies if the augmentations allow users to look more like their ideal selves. This may influence the customer to evaluate products more favourably, and may make them eager to spend more time with the technology. The first step for achieving this is to ensure that the user is facing a flattering reflection of themselves. From what I found in my research, it looks like some companies are already taking advantage of this by enhancing the user's reflection in their mirror. Furthermore, the technology could be designed to customise augmentations to the customer. This would be easier if the customers could log into individual profiles when using the technology, with information about their preferences and purchasing history.

There could be ways of exploiting this which would benefit the consumer. If the augmented self is achievable for the consumer, and they are advised on how to achieve it, it could serve as guidance and motivation. A person who desires to lose weight may find it motivating to see a version of themselves which can be achieved through the right diet and exercise. Using AR in this way could open up for a new way of helping consumers reduce the discrepancy between their actual and ideal self. AR could be used as a tool to help consumers identify their ideal self, and the consumer could then be consulted on how to augment their physical selves in a way that brings them closer to it.

In most cases however, companies ought to thread carefully when it comes to manipulating the consumers' appearance in AR. As I have shown in my research, being heavily exposed to a liminal self which is closer to one's ideal self may cause dysmorphia among some consumers. Unfavourable consequences are more likely to occur when the consumer starts blending the real world and the augmented world, so an option would be to help the customer be aware that their reflection has been manipulated and beautified, or to make the customer able to turn the function on or off themselves. This is relevant not only for the beauty industry, but for the general fashion industry, where Magic Mirror technology may be introduced to fitting rooms. While manipulation of the body and face is to some extent possible with different types of mirrors (Peterson, 2014) and lighting (Baumstarck & Park,

2010), the potential of doing so is even larger with Magic Mirrors, which can manipulate different parts of the body and face independently.

7.2.2 Implications for the future development of AR

Augmented Reality is still considered by many to be at its infancy stage (DeMers, 2016). With continuous developments and improvements of the technology, it will be interesting to see how far it can go.

It is likely that in the future more and more companies and retailers will be competing in the digital space, all trying to obtain the best technology to achieve a better and more innovative consumer experience. A way such technology could become much more omnipresent however is through wearable technology.

Smart Glasses is a wearable AR device which captures the user's physical environment and augments it with virtual elements (Rauschnabel, Brem, & Ro, 2015). A well-known example of this is the Google Glass, which turned out to be a market failure (Reynolds, 2015). Other companies have however picked up the ball in developing AR headsets. Both the Magic Leap headset and Microsoft's Hololens are currently available for developers (Pachal, 2018).

If AR headsets become a big a success as smartphones, it could change how we observe the world, making AR omnipresent in our everyday lives. Combining such glasses with the technology of Snapchat and Magic Mirrors could be interesting, allowing us to see augmented versions of each other when passing one another on the street.

This is interesting with regards to the limitations of AR which I mentioned in my theoretical contributions; that the augmentation is only temporary and is difficult to share with others. Smart Glasses and AR Headsets would allow consumers to experiment and play with appearance in a way they could carry with them and show others who used the same technology. It is possible that stronger norms would develop for augmented selves if it became a more integrated part of culture. It could also give consumers the possibility to "wear" their ideal selves. I will abstain from judging whether this would be a good or a bad thing.

7.3 Limitations

With a larger timeframe and budget, it would have been interesting to study a larger sample of customers, to collect more in-store observations and more interviews that went even more in-depth. I believe it would have been valuable to make two research trips, where the second one was focused on further developing the insights obtained on my first trip. This would have strengthened my dataset and perhaps made it possible to access deeper insights and develop more detailed theory. However, I actively used various secondary data sources to ensure the trustworthiness of my results.

My sample was relatively homogenous; consumers who visit the makeup boutiques I went to are most likely more interested in augmenting themselves than the average consumer. Although the interviewees an observed vloggers were of various national backgrounds, the sample was overly representative of Western cultures. In other cultures, consumers may have reacted differently to the technology. In Japan and South Korea it is popular to augment the self in ways which may be seen as extreme here, both by physical and digital means. It is likely that this kind of technology would feel less new to consumers from these countries, and that they would be even more comfortable with experimenting with the self. In other countries there are much stricter norms as to what appearances are appropriate, and it would be interesting to observe how comfortable consumers from such cultures would be with experimenting with the self in a Magic Mirror.

It would have been interesting to design and conduct quantitative studies to test my propositions. One idea for a quantitative study is to offer participants similar tools to experiment with in the real environment and in AR, and observe differences in behaviour. Another is to observe differences in behaviour with different kinds of Magic Mirrors, where the assortment and customisation varied. In order to test my propositions on the liminal left and shift in self-concept, one could cooperate with participants in constructing liminal selves which are closer to their ideal selves, and observe how exposure to these liminal selves affect the participants over time. Such a study may however have a negative psychological effect on the participants.

8. Conclusion

The aim of my research was to determine how and why virtual augmentation of the physical self influences consumer experiences and attitudes. In short, my findings indicate that AR technology influences consumers' attitudes towards experimenting with the self, and that AR has the potential to influence consumers' experience of self. I theorise that AR can temporarily relieve both cognitive dissonance and discomfort caused by self-discrepancy.

AR makes consumers comfortable with changing their appearance virtually in ways they would abstain from in the real environment. My study indicates that AR moderates the consumer's beliefs by disconnecting them from the cultural norms of the real environment. I propose that this dynamic allows consumers to construct different systems of preferences at different points of the Reality-Virtuality continuum. A larger pool of possibilities increases the ways in which the consumer can experiment with the self through AR.

AR allows consumers to pursue an augmented version of themselves which is closer to their ideal selves, and I propose that consumers with a large discrepancy between their own standpoint on the actual and ideal self are more likely to do so. The liminal quality of this self may cause a shift in consumers' self-concept if they are heavily exposed to it, which could cause dysmorphia. Consumers may however adopt the AR technology faster if their augmented reflection is closer to their ideal self than their actual self is.

It is important for managers to be aware of the deeper effects AR may have on consumers when investing in such technology, as this will help them design solutions which are more enjoyable and interesting for customers to use, and which do not influence customers in unfavourable ways.

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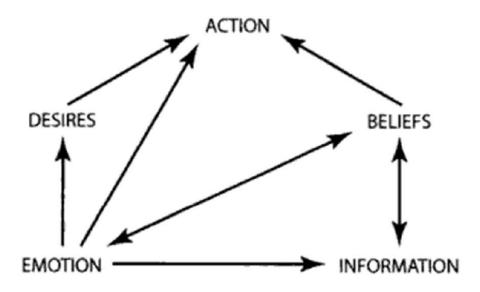Yim, M. Y.-C., Chu, S.-C., & Sauer, P. L. (2017, August). Is Augmented Reality Technology an Effective Tool for E-commerce? An Interactivity and Vividness Perspective. *Journal of Interactive Marketing*, pp. 89-103. Retrieved from https://www.sciencedirect.com/science/article/pii/S1094996817300336

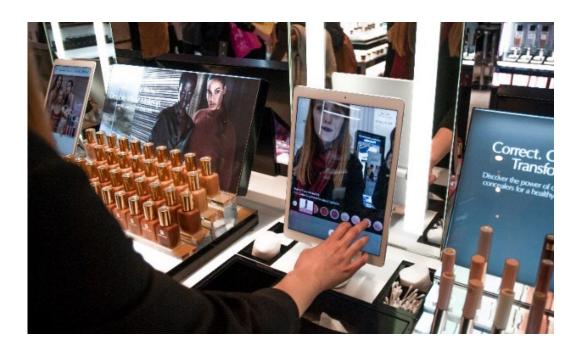Yin, R. K. (2014). *Case Study Research: Design and Method* (5 ed.). London: Sage.

10. Appendix

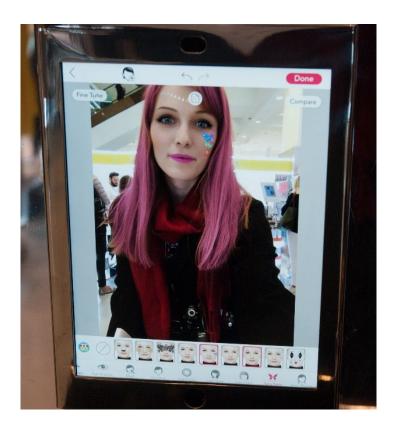*Appendix 1 Model for action (Elster, 2009)*

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Appendix 2a - The Charlotte Tilbury Magic Mirror

Appendix 2b - The Charlotte Tilbury Magic Mirror

Appendix 3 - The Estée Lauder Magic Mirror

Appendix 4 - YSL's Magic Mirror

Appendix 5 - Interview guide for employees (semi-structured)

- How long have you been working in this shop?
- How and why does your shop use magic mirrors?
- Describe how a typical customer behaves when interacting with the magic mirror.
- What do you think about magic mirrors?
  - *Possible follow-ups:*
  - o What do you believe of the future of magic mirrors?
  - o How do you believe magic mirrors will affect testing of makeup products?
  - o How do you believe a magic mirror will influence the role of in-store makeup experts?
  - o How has the adoption of the magic mirror affected what customers ask of you as an employee?
  - o What is your impression of the magic mirror's effect on purchases, if any?

Appendix 6 - Interview guide for customers (semi-structured)

- Are you familiar with the term magic mirror?
  I will explain if needed that a magic mirror is a screen camouflaged as a mirror, much as the selfie camera on your phone, which through augmented reality technology can add makeup virtually on your face.

- Have you tried the magic mirror in this shop?
  - o **If no:** Is there a reason for why you have not tried it?
    I might ask them to try the mirror with me. If they are opposed to the technology in some way, this needs to be explored further.

  - o **If yes:** Ask the following:
- When you tried the magic mirror for the first time, what was the reason?
- Describe your most recent experience with using the magic mirror in this shop.
- Describe the rest of your visit in the shop after interacting with the magic mirror.
  - *Possible follow-up if they purchased something:*
  - o How do you think the interaction with the magic mirror affect you to purchase product X?
- How would you compare trying makeup virtually in a magic mirror versus physically testing makeup?
  - Describe your everyday use of appliances and gadgets, for example, phones, computers, television, gaming consoles, etc.
    Possible follow-ups:

      o If they have a smartphone: What apps do you normally use? Why? How?
           ▪ What apps do you use to communicate with your friends?
      o How are your preferences with regards to shopping online versus in physical shops?

Appendix 7 - Interview guide for technology consumers (unstructured interviews)

- Describe your everyday habits with technology.
  Follow-ups will depend on the answer.