The Impact of Augmented Reality Applications on Consumer Search and Evaluation Behavior

cand.merc. Strategic Market Creation

Supervisor: Anne Martensen

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Federica Cehovin

Bernice Ruban

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Abstract

A rising number of marketers are considering using augmented reality for marketing purposes. Past research has indicated that mobile augmented reality does influence consumer behavior and responses. However, little is known about how the use of this medium affects consumer decision-making. The aim of this paper is to reveal how mobile augmented reality impacts the search and evaluation behavior of consumers in the consumer decision-making process. For this purpose, we focus on how the three media characteristics of augmented reality, augmentation, interactivity and registration, impact the emotional and cognitive dimension of the consumer's experience during search and evaluation. An empirical study combining an observational experiment and an interview was conducted, examining two augmented reality applications: the *L'Oréal Genius Makeup app* and the *IKEA Catalog app*. Results indicate that augmentation and interactivity do positively influence both the emotional and cognitive dimension of the experience, while the lack of registration negatively affects search and evaluation. Further, novelty and technological quality of the app were also found to play an essential role in shaping the consumer experience. Finally, implications for academic research and managerial decision-making are examined.

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List of Abbreviations

AR: Augmented Reality

AV: Augmented Virtuality

CDJ: Consumer Decision Journey

CDP: Consumer Decision Process

CDS: Consumer Decision Strategies

EKB model: Engel-Kollat-Blackwell model

MR: Mixed Reality

VR: Virtual Reality

Chapter 1: Introduction

1.1. The emergence of Augmented Reality

The new trending phenomenon of the digital world, which enhances the physical world with digital information, is called augmented reality (AR). Its emerging ubiquity is heralded by the growing media coverage it receives in trade papers (e.g. Handley, 2013), business magazines (e.g. Forbes, 2017; Business Insider, 2016; Wall Street Journal, 2016) and national newspapers (e.g. NY Times, 2016; Süddeutsche Zeitung, 2017; Corriere della Serra, 2016). After the success of mobile applications utilizing AR, such as *Pokémon Go* and *Snapchat*, among the broad consumer masses, the media as well as brands and venture capitalists from all kinds of industries took notice. Companies as diverse as *Apple, Facebook, Alphabet, Disney* and *Wayra* are investing millions into the development of new AR solutions hoping to get a head start on what Business Insider (2016) called *"the next level in platform evolution, after PC and mobile.*" (Recode, 2017). Venture capitalists such as *Rothenberg Ventures, Y Combinator* and *Presence Capital* have also recognized the potential of AR and have begun acquiring several promising AR start-ups (Recode, 2017). In fact, a report from Digital Capital (2016) forecasts the investments into AR to rise to $90bn by 2020, surpassing the investment into virtual reality, which constructs a completely digital world by blocking out the physical world, by approx. $60bn.

Some researchers have argued that the increased hype in AR in the recent years is due to the potential it develops when combined with mobile devices (Craig, 2013; Yaoyuneyong, 2016). Many technologies required for AR applications have now become native to contemporary consumer devices, the most conspicuous illustration of which is that of the device's camera, which acts as a portable window allowing users to access virtual information embedded into the physical world through a software interface (O'Mahony, 2015). Moreover, where AR systems were once limited to predominantly ad hoc contexts in which environmental variables were controlled, native location sensors such as the Global Positioning System (GPS) combined with a high bandwidth

communication capacity have now enabled the growth and adoption of mobile AR applications (Kangas, 2002; Takacs, 2011; O'Mahony, 2015). Further, seeing as the majority of consumers today own their own mobile devices, there is no need for them to acquire additional equipment for running an AR application, which increases the likelihood of their adoption considerably. Indeed, Juniper Research predicts the AR app market to generate revenues of $6bn by 2021 (MarketWired, 2016).

Marketers worldwide have started to recognize the promise such mobile AR applications have for marketing and branding purposes. *McDonald's Australia*, for instance, developed the AR app *TrackMyMaccas* with which consumers can augment their McDonald's boxes with ingredient-sourcing information (Telegraph, 2013). The brewing company *Stella Artois*, on the other hand, launched the AR app *Le Bar Guide*, which assists users in finding bars selling Stella Artois' products (PR Newswire, 2013). At the same time, *Tokyo Sunshine Aquarium* and *Tivoli Gardens* enhanced their visitors' experience with the help of augmented characters, such as penguins or zombies (IB Times, 2014; Tivoli, 2016). Many more companies, such as *Cadbury*, *Heinz Ketchup* and *Pepsi* also delved into enhancing their brand experience with mobile AR applications (Scholz & Smith, 2016).

Particularly in today's economy, in which the focus has shifted from traditional product and service marketing and pushing individual transactions to creating a memorable brand experience and creating a long-term relationship with the customer, AR Marketing could be of immense value to brands (Sheth, 2002; Vargo & Lusch, 2004; Pine & Gilmore, 2002). As AR is expected to become part of our daily mobile experiences, especially in the areas of retail and marketing (ABI Research, 2013; Yaoyuneyong, 2016), it constitutes a valuable platform through which brands can establish a closer relationship with the consumer. Marketers assume that through AR they can create a more holistic brand experience for consumers reaching beyond physical environments (Yaoyuneyong, 2016). Moreover, due to the novelty that is still associated with AR, the hope is that AR campaigns and applications have the potential to break through consumers' defense mechanism and attract their much sought after attention.

However, some marketers are still skeptical about the benefits of using AR in their marketing and brand communication. Many companies are concerned that AR marketing could turn out to be nothing more than a gimmick and are skeptical whether they will receive an actual return on their investment (Marketing Manager Imagination GmbH, 2016). So far, little research has been undertaken to discover the influences of AR on consumer behavior and more precisely their purchase decision-making (Scholz & Smith, 2016). Yet, such insights are of immense importance to marketers when considering investing in AR marketing. Therefore, the lack of studies complemented by the rapid rise of AR and the expected increasing value of the AR market urge the need for a prompt clarification of the effects of this form of experiential marketing (Bulearca & Tamarjan, 2010).

1.2. Augmented Reality in research

AR has been a topic of research for several years now. Since the late 1980s academics have researched the idea of enhancing reality with the help of digital means, and out of their attempts to better understand AR, two strands of research have emerged: research concerning the more technical nature of AR, and research concerning potential uses of AR (Rouse et al., 2015). The first line of research, which has received a lot of attention particularly in the beginning of AR research, is mainly interested in the technological side of AR (O'Mahony, 2015). These researchers investigate, for example, how to optimize the design of head-mounted displays (Caudell & Mizell, 1992), the use of fiducial markers for AR video tracking (Kato & Billinghurst, 1999), or methods for real-time object identification (Rekimoto, 1998). The latter, more recent line of research, on the other hand, looks into how AR applications could be used in various application areas, including which aspects are of special importance to users and users' adoption of and response to AR applications within that area (Rouse et al., 2015). The three AR application areas which have raised the most interest by far are the entertainment, health, and education industries.

AR in Entertainment, Education and Health. Seeing as AR, like virtual reality, has its origins in the entertainment industry, it is not surprising that both companies and academics have paid special

attention to AR in entertainment and that a wide variety of applications for gaming, sightseeing, and travelling now exists (Berryman & Hoy, 2012; Carmigniani & Furht, 2011). Several apps like *Pokémon-Go*, *Ingress* and *Yelp Monocle* enjoy high popularity with consumers, achieving more than 10 million downloads in Google Play each year (Google Play, 2017). Researchers have also found the topic to be of interest. João et al. (2012), for instance, studied location-based AR games, Von der Pütten et al. (2012) researched how a feeling of presence in gaming is related to the use of AR technology, and Kourouthanassis et al. (2015) examined tourists' use and adoption of mobile AR travel apps.

Researchers also recognized the potential of AR as a supporting tool in education. AR applications can, for example, make a visit to the museum an unforgettable experience or turn a lecture on history into a journey through time (Berryman & Hoy, 2012; Carmigniani & Furht, 2011). Billinghurst et al. (2001) suggested a model for enhancing a normal book with AR. Other researchers used this idea as inspiration to begin researching how AR could facilitate childhood learning in particular (Yilmaz, 2016; Cheng & Tsai, 2014; Han, et al. 2015) and education in general (Lee, 2012; Wu et al., 2013; Nincarean et al., 2013).

Finally, the use of AR for medical purposes has also been of great interest to academics and practitioners. Especially image-guided and robot-assisted surgery has benefited from the findings of extensive studies (Carmigniani & Furht, 2011; Azuma, 1997; Berryman & Hoy, 2012). Researchers such as Okamoto et al. (2013) and Kang et al. (2014) explored the uses, as well as advantages and disadvantages of AR applications in surgery and found its potential to be immense. Moreover, others discovered AR to be useful for treating mental diseases and developing therapies (Oliver & Bouchard, 2014; Zhao, et al., 2015). All in all, the health industry has a wide array of uses for AR (Carmigniani & Furht, 2011).

AR in Marketing. Unlike the entertainment, education and medical industries, marketing has only recently become an area of interest for AR researchers. Only after companies like *BMW*, who were

the first to attract attention with an AR advertising campaign in December 2008, started experimenting with AR, did academics turn their attention towards the uses AR could have for marketers (Berryman & Hoy, 2012). Since then researchers have begun to investigate how big the potential of AR for marketing really is.

Bulearca & Tamarjan (2010) as one of the first to begin researching AR in the domain of marketing, explored how AR experiential marketing could benefit brands through increasing brand loyalty and word-of-mouth. Spreer & Kallweit (2014) on the other hand, studied how AR could improve the evaluation of information at the point-of-sale, while Javornik (2016) researched how consumers respond to AR media characteristics in general, and Huang (2015) experimented with online exploratory consumer behavior in the context of AR. Other researchers proposed heuristics to be considered when developing an AR marketing campaign (O'Mahony 2015; Scholz & Smith 2016). Finally, Yaoyuneyong (2016) found that consumers prefer AR print advertising to traditional print advertising, Dacko (2016) gave insights into how mobile AR apps can provide the consumer with value in the retailing industry, and Javornik et al. (2016) observed consumers' reactions to an AR 'magic mirror' in a retail store.

In conclusion, four distinct approaches to studying AR have emerged in AR marketing research. Some authors approached the subject from an experiential marketing perspective, attempting to discover the experiential value evoked by AR (Bulearca & Tamarjan 2010; Yaoyuneyong 2016; Dacko 2016), while others focused more analyzing consumers' behavior in relation to AR (Javornik et al. 2016; Poushneh & Vasquez-Parraga 2017; Javornik 2016). Further AR research has on the one side concentrated on how marketers should use AR (O'Mahony 2015; Scholz & Smith 2016), and on the other side how consumers perceived AR (Spreer & Kallweit 2014).

However, despite the important role AR plays with regards to consumer behavior, little is known about its impact on consumer decision-making, despite the purchase decision constituting the ultimate goal of all marketing activities and resulting in revenue for the brand. We address this gap

by exploring the influence of AR on the search and evaluation behavior of consumers during their decision-making process. We argue that during search and evaluation consumers are most susceptible to informational and experiential influences, as this is the time in which they make up their minds about a product and brand (Shocker et al. 1991; Kollat et al. 1970). Consequently, we argue that the impact of AR would be strongest during this phase, in which they actively search and consider brand information. Hence, this paper aims to find how the use of AR in marketing impacts the consumer's search for and evaluation of information during his decision-making process. More specifically, due to the high potential AR develops when combined with mobile devices (see section 1.1.) we aim to research:

How do mobile augmented reality applications influence the search and evaluation behavior of consumers in the consumer decision-making process?

For this purpose, we need to first gain more insights into the topics of AR and consumer decision-making in general, and understand how consumers interact with and react to branded AR applications. Therefore, we believe it is essential to explore the answers for the following questions in order to advance our research:

- How do we define AR?
- How do consumers interact with branded AR applications?
- What constitutes the consumer decision-making process and which dimensions of search and evaluation drive purchase intentions?
- Which AR characteristics impact these search and evaluation dimensions and how?

1.3. Philosophy of science

Within this paper, we employ a pragmatist approach to research, combining elements of both constructivist and realist philosophies. Pragmatism as a philosophy of science has existed since 1878 when American philosopher Charles Sanders Peirce first drafted pragmatism's maxims, but has gained importance only since the 1970s (Egholm 2014). At the core of the pragmatist philosophy lies the belief that the true meaning of a concept is to be found in the practical consequences of the idea (Goldkuhl 2012; Saunders et al. 2016). In other words, reality and truth can only be understood when considering the consequences of actions. Human actions are perceived to be the instrument to changing existence and should be guided by purpose and knowledge (Goldkuhl 2012; Egholm, 2014). Thus, human actions are considered to be a key construct of pragmatism (Egholm, 2014). Distinguished pragmatist, George Herbert Mead, expanded on the action concept by dividing it up into several phases, which were later combined to form a cyclic model of human action consisting of a pre-assessment, interventive action and post-assessment phase (Goldkuhl 2012). In light of this action model, the consumer decision-making process we are examining in this study can clearly be classified as a human action. Therefore, a pragmatist approach seems appropriate.

Unlike other philosophies of science, pragmatism does not object to combining different types of knowledge or methods so long as the research problem does not unambiguously require one particular approach (Saunders et al. 2016; Almeder 2007), which our research into AR's impact on consumer's search and evaluation behavior during decision-making does not. Rather proponents of pragmatism argue that research design and strategy should be exclusively determined by the research problem, and the aim to find a practical solution for future use, based on credible, well-founded, reliable and relevant data (Saunders et al. 2016; Goldkuhl 2012). One of the most influential philosophers in pragmatism, John Dewey, describes this idea in his concept of inquiry, stating that the aim of any inquiry, or research, should be "*to create knowledge in the interest of change and improvement*" (Goldkuhl 2012, pp. 139). Within his concept, he maintains that such an interest can be both cognitive and practical at the same time (Goldkuhl 2012).

Hence, pragmatism focuses on the instrumental value of knowledge for making a difference in practice, rather than restricting the type of knowledge pursued by our research to, for example, explanations or understanding, as other philosophies would (Goldkuhl 2012; Saunders et al. 2016; Almeder 2007). Goldkuhl (2012) describes this as pursuing constructive knowledge. Consequently, in pragmatism both constructivist and realist beliefs can co-exist next to each other (Egholm 2014). Proponents of this philosophy acknowledge that individuals interpret phenomena and situations subjectively, but also recognize that phenomena and situations are placed in an objectively real context, which limits the extent of possible interpretations (Egholm 2014; Saunders et al. 2016). This means that employing a pragmatist approach allows us more flexibility in conducting our research, as we are free to choose a research design that combines qualitative and quantitative elements as well as subjective and objective knowledge. Another advantage of using pragmatism as a philosophy of science for this paper, is based on the fact that pragmatism considers all types of knowledge to possess value. As a consequence, research, which is always based on the researcher's interpretations and qualified assumptions, cannot produce value-free knowledge by lacking objectivism as long as it furthers our understanding of the situation studied (Egholm 2014).

1.4. Research approach

This paper presents an empirical research model that looks at how the AR characteristics of augmentation, interactivity and registration impact the emotional and cognitive dimensions of the consumer experience during search and evaluation. We argue that these two dimensions play an essential role in influencing the search and evaluation behavior of consumers (Mishra & Olshavsky, 2005). Further research has shown that AR does affect emotional and cognitive mental processes of consumers (Huang, 2015; Spreer & Kallweit, 2014) and most AR literature considers at least one of these dimensions (Javornik, 2016; Yaoyuneyong, 2016; Scholz & Smith, 2016, Poushneh & Vasquez-Parraga, 2017) or even both (Javornik et al., 2016; Dacko, 2016; Bulearca & Tamarjan, 2010) as a basis for their studies. Therefore, based on the frequent consideration of these dimensions within AR research we believe it important to include them in our studies. Particularly,

whether AR impacts the two dimensions to varying degrees can be considered a relevant topic for marketers to understand.

In conclusion, this paper approaches AR by studying its media characteristics and how they influence the emotional and cognitive dimensions of consumers' search and evaluation behavior. For this purpose, two AR applications, the *IKEA Catalog app* and the *L'Oréal Makeup Genius* were investigated in a mixed-method approach combining an observational experiment with an interview consisting of semi-structured and structured parts. Our findings revealed that overall AR applications had a positive effect on the consumer's search and evaluation behavior. The interactivity and augmentation of the AR would elicit positive emotions within the consumer, and trigger a more active explorative behavior. Depending on the quality of the technology behind the app it will also provide the consumer with a better understanding of the product. However, the impact of these two media characteristics varied depending on the product type and emotional bond to the brand. Conversely, the AR media characteristic of registration, was found to influence the consumer experience similarly to Herzberg's hygiene factors impacting the experience negatively when lacking. Good registration, on the other hand, evoked a slightly positive reaction both emotionally and cognitively, which we argue is due to the novelty of AR. In general, both the novelty of AR as a medium and the AR apps technological quality were found to play an important role in the consumer's overall experience.

These findings offer important academic and managerial implications. First, this paper provides evidence that AR is not just a gimmick, but actually does influence consumers' search and evaluation behavior. Consequently, AR might be a valuable investment for companies to consider. Second, it guides marketers in understanding how AR influences consumers' search and evaluation behavior and consequently helps them to make better strategic decisions with regard to their AR application's design. It aims to prevent mistakes based on confusion about the impact of the technology when adopting AR applications, by providing marketers with some relevant insights. Finally, we believe that this paper can serve as inspiration and a foundation to researchers for future research into the

influence of AR on consumer behavior, and more particularly on the consumer decision-making process.

The first two sections of this paper guide the reader through a more theoretical part where the AR concept is described and the consumer decision-making process is delineated. Based upon this literature review a framework is developed, which is then used as a foundation for advancing research propositions. A description of the two case companies follows, together with a detailed presentation of how the research methodology is developed. Finally, the results are portrayed together with a discussion and the paper's main implications and contributions.

Chapter 2: Case companies

As our case companies, we have chosen two very different, yet well-known brands, which have demonstrated themselves to be first movers in the usage of AR in their marketing communication: *L'Oréal* and *IKEA*. These two companies produce and sell products, that could not be more different - cosmetics and furniture. Cosmetics are products that are bought on a more regular basis and are often bought out of affect, whereas furniture is typically only purchased infrequently and as the result of a long-thought process. Consequently, the search and evaluation behavior of consumers differs greatly between these two classes of product. Analyzing and comparing these two diverse companies allows us to gain broader insights into how AR applications impact search and evaluation behavior.

However, these two industries do share some key characteristics. Both classes of product are close to a consumer's identity, and with both product types the consumer places high value on receiving visual and personalized information (Kramer et al. 2000). Hence, companies in both these industries could profit immensely from using AR applications. Both *IKEA* and *L'Oréal* have recognized this potential and have been the first in their industries to produce a branded AR application. The fact

that they have had their AR applications for a while, has allowed them to remove the biggest bugs and improve the technology supporting their apps. This will allow us to get more concrete results related to the actual characteristics of AR and will reduce the bias that malfunctioning technology could have on the results.

Table 1: Company overview - IKEA & L'Oréal		
Case Company	**The L'Oréal Group**	**IKEA**
Founded	1909,	1943, in Småland (Sweden)
Industry	Cosmetics	Furniture & living
Market size	130 countries	28 countries
Net profit FY16	4.5bn EUR	4.2bn EUR
Application	**Makeup Genius**	**IKEA Catalog**
Short description	Enables you to virtually try on makeup	Places furniture into your room
Systems	Android; iOS	Android; iOS
Rating (Google)	2.9	3.7
Downloads (Google)	+1.000.000	+10.000.000

Sources: IKEA (2017); L'Oréal (2017), Google Play (2017)

2.1. L'Oréal: company and brand

Founded in 1909, the *L'Oréal Group* has become the largest cosmetics and beauty company in the world, creating cosmetics, perfume as well as hair and skin care items (L'Oréal, 2017). They serve every type of market, including the mass-market, the luxury market and the retail and salon sectors, making use of different brands such as *L'Oréal Paris, Lancôme, Garnier* or *Essie*. *L'Oréal* is a world leader in beauty and it is present in 130 countries on five continents (L'Oréal, 2017). The group's mission is to provide the best in cosmetics innovation to women and men around the world with respect for their diversity.

One of the most prominent brands within the *L'Oréal Group* is *L'Oréal Paris,* a top beauty brand sold in retail outlets. It offers all kind of beauty products for both males and females, such as makeup, skin care, hair care, styling, and hair color (L'Oréal Paris, 2017). *L'Oréal Paris* is a globally renown brand, which according to its own website sells 50 products every second worldwide and is supported by 35 international celebrity ambassadors, like *Julianne Moore* and *Eva Longoria* (L'Oréal Paris, 2017). Its motto "*Because you are worth it*" is well-known amongst women of all ages, and aims to portray the brand's universal message of empowering beauty and has been promoted over the last 40 years. *L'Oréal Paris* attempts to help every woman to embrace their beauty and strengthen their confidence, and prides itself on making innovative products accessible to everyone. *L'Oréal Paris* is considered to be a leader in technology, research and innovation (L'Oréal Paris, 2017). As it is a company operating in the mass market, innovation becomes a key survival factor as well as source of competitive advantage, ensuring future growth and customer need satisfaction. The company's scientific spirit has played a fundamental role in the brand identity and has led them to become leaders in driving market changes (Emerald Insights, 2013).

2.2. IKEA: company and brand

One of the most recognizable brands worldwide is the Swedish furniture retailer *IKEA*, which was founded in 1943 (Dahlvig et al. 2003). *IKEA* managed to prevail against competing furniture brands in over 25 countries, thanks to its unique '*IKEA concept*'. This concept, which was developed in the 1950s and has shaped the *IKEA* brand to this day, rests on five key ideas. First, rather than having boutique stores inside the city center, *IKEA* locates its warehouse-type stores on the city outskirts. Second, *IKEA*'s main target group are young people and families. Usually, furniture retailers tailor their offers to middle to upper class customers. Third, unlike most of their competitors, *IKEA* minimized the service level as much as possible. Customers serve themselves in the stores, and they need to transport and assemble the furniture themselves. Moreover, *IKEA* has counted on global sourcing for its products from a very early stage on, which allowed them to cut costs

drastically. Finally, *IKEA* products are all held in the light Scandinavian style, which is very different to many other traditional, often heavier styles. (Dahlvig et al. 2003).

Based on this innovative concept *IKEA* built its fame and expanded globally. Their national brand perceptions depend heavily on how they entered the individual markets. In Sweden, *IKEA* is seen as a brand for everyone, whereas in the UK it is a more niche, yuppie brand (Dahlvig et al. 2003). Overall the *IKEA* brand is considered to be quite homogeneous globally, distinguishing itself from other furniture brands by being different. *IKEA* management keeps working on maintaining this image of being cutting-edge (IKEA, 2016). Thus, it does not seem surprising that *IKEA* is one of the first companies to adopt AR into its communication and marketing portfolio.

Chapter 3: Augmented Reality

In this chapter, we introduce the concept of augmented reality (AR). We first define AR and its characteristics and contrast it to other reality technologies. Then we briefly look into the history of AR and explore its applications in marketing. Finally, we inspect what constitutes an AR user experience.

3.1. What is Augmented Reality?

3.1.1. Definition & characteristics

The term *'augmented reality'* has been used very broadly in literature, often including a wide array of technologies. Where some researchers keep the definition of AR quite open, others prefer to narrow it down to something more specific. Hence, AR can mean anything from GPS mapping systems to Google Glasses, which can make it difficult to understand what exactly people mean, when they talk about AR. (Craig, 2013; Yaoyuneyong, 2016; Bulearca & Tamarjan, 2010).

Nonetheless, researchers do agree on some common elements in their definitions. Particularly, all definitions found in AR literature include that AR enhances the physical world with some kind of virtual, computer-generated information (Bulearca & Tamarjan, 2010; Yaoyuneyong, 2016; O'Mahony, 2015; Javornik, 2016). This is in line with the English meaning of the word '*to augment*', which serves as a basis for the term '*augmented reality*' and means "*to make greater, more numerous, larger, or more intense*" (Merriam-Webster, 2017). This enhancement does not necessarily have to be visual, but could also pertain to any other sense, e.g. augment the user's smell, taste or touch (Craig, 2013; Carmigniani & Furht, 2011). That being said, most AR systems in use today primarily focus on the visual sense. Some commonly used definitions have been collected in Table 2.

Table 2: Definitions of augmented reality

Authors	**Definitions**
Azuma (1997: 356)	Any system that has the following three characteristics: 1. Combines real and virtual 2. Is interactive in real time 3. Is registered in three dimensions.
Carmigniani & Furht (2011: p.3)	A real-time direct or indirect view of a physical real-world environment that has been enhanced/augmented by adding virtual computer-generated information to it.
Reitmayr & Drummond (2006: 1)	A promising user interface technique for mobile, wearable computing and location-based systems.
Craig (2013: 20)	A medium in which digital information is overlaid on the physical world that is in both spatial and temporal registration with the physical world and that is interactive in real time.
Berryman and Hoy (2012: 213)	The process of overlaying computer-generated information on reality, whether that reality is a geographic place or an object

To further narrow down the definition of AR, most authors add a number of key characteristics, an AR system has to exhibit. The most frequently cited of these features were developed by Azuma (1997), who mentions three key characteristics of AR (Craig, 2013; Yaoyuneyong, 2016; Huang et

al., 2013). According to them, any AR system has to (a) combine the real and the virtual in the physical environment, (b) be interactive in real time, and (c) display registration (alignment) of the virtual information in the 3D environment. These traits are commonly used to distinguish AR from other technologies and media. The first highlights the fact that when using an AR system, the user will still be aware of his surroundings (Craig, 2013). The second stresses that the user needs to be able to engage with the system in order to get the full experience. The degree of interaction, however, can alter from simply changing the perspective to actively manipulating the virtual information provided (Carmigniani & Furht, 2011; Craig, 2013). Finally, the third characteristic requires AR to exhibit spatial and temporal registration, which means the virtual information needs to be aligned with the real world. In other words, the virtual has a physical location in the real world, just like a real object might, and every time the user changes his physical viewpoint the perspective on the virtual augmentation changes. Moreover, temporal registration with the world, meaning time lags, e.g. due to information processing, should be minimized as much as possible (Craig 2013). The closer both the temporal and spatial registration are with the real world, the more seamless and immersive the AR experience will be. (Craig, 2013; Azuma, 1997)

Other researchers have adapted and developed these three characteristics of Azuma (1997). Some added a dimension, like Craig (2013), who also requires that the virtual information displayed by the AR system be dependent of the geographic location and physical perspective of the AR user in the real world, while others supplemented some of the characteristics with their own interpretations. Javornik (2016), for example, assert that AR systems demonstrate seven traits: interactivity, hypertextuality, modality, connectivity, location specificity, mobility, and virtuality. Nonetheless, the three characteristics identified by Azuma (1997) still provide the most widely accepted definition of AR, and will, therefore, be used in the remainder of this paper.

It is important to note at this point that AR can be implemented by a broad variety of technologies. For example, the virtual information could be experienced through a digital screen of a computer or a mobile phone, or as a projection, e.g. a hologram. Therefore, several researchers classify AR as

a medium rather than a technology in itself (Scholz & Smith, 2016; Yaoyuneyong, 2016; Craig, 2013). In this paper, we will be dealing exclusively with mobile AR, that is enabled through the use of mobile devices, such as smartphones or tablets (Lonergan & Hedley, 2014), as the adoption rate of this type of AR at the consumer level is presumed to be higher due to the general availability of mobile devices (Hyeon-Cheol & Yongho Hyun, 2016)

3.1.2. The Reality-Virtuality continuum

Consumers often have difficulties distinguishing the various digital media currently available in the market. Terms such as '*virtual reality*' (VR) or '*mixed reality*' (MR) are often confused with AR. For this reason, the next section will compare and contrast some well-known reality-altering technologies in an effort to better differentiate AR.

One way to define these technologies is to line them up against each other in a taxonomy. The most highly cited taxonomy in AR/VR literature is the Reality-Virtuality continuum set forth by Milgram et al. (1994) in which the authors see the real world and the virtual world, or virtual reality, as being two ends of a continuum. They argue that the real world is constructed by real objects and consequently governed by the laws of physics, whereas the virtual world is an entirely synthetic environment consisting of virtual objects and thus is not limited by the rules of reality. Milgram et al. (1994) contend that everything in-between these two extreme states, i.e. everything that mixes the real and the virtual, should be considered mixed reality. They then continue by dividing MR into two sub-categories: AR, which augments the real world with the virtual, and augmented virtuality (AV), which augments the virtual world with real-world entities (Milgram et al., 1994; Milgram & Kishino, 1994). Thus, all AR systems can be considered to be MR, but not all MR systems are also AR (Craig, 2013; Lonergan and Hedley, 2014). This way of distinguishing between AR, MR and VR has been widely adopted by the AR/VR research community (Lonergan and Hedley, 2014; Rouse et al., 2015; Craig, 2013; Carmigniani & Furht, 2011).

Nevertheless, some researchers have taken the stance that AR is a subset or variation of VR, while others again maintain the opposite – VR being a type of AR in which the real world is simply omitted (Azuma, 1997; Craig, 2013). Yet, whichever way one argues, it is clear that virtual reality and AR do differ considerably on one dimension – the extent to which they utilize the real world. VR, for example, inhibits the user from sensing his physical environment. Thus, VR is not necessarily dependent on the geographic location of the user. AR, in contrast, enhances and supplements the physical reality of the user rather than replacing it entirely, which makes the real world a primary component of AR (Carmigniani & Furht, 2011; Berryman & Hoy, 2012; Azuma, 1997; Craig, 2013). Besides making the specific location of the user more relevant, this reliance on the real world also brings higher technical requirements in terms of registration for the AR application. Azuma (1997) found that even though limited accuracy in a virtual world does not matter too much, because problems with alignment are more difficult to detect, it is of high importance when the real and the virtual are combined. Without near to perfect alignment, the illusion of the two worlds coexisting will be compromised (Azuma, 1997).

3.2. Origin of Augmented Reality

From the beginning of time, human beings attempted to alter reality. First, by physically changing their environment, e.g. by sharpening the edges of a rock to turn it into a knife, and later by representing ideas through physical means, e.g. by drawing a map on a piece of paper (Craig, 2013). With time and technological development, it became increasingly easier to represent ideas and enhance reality physically. Yet, it was only in the 1950s that the idea of AR first appeared, when cinematographer Morton Heilig envisioned a film-going experience engaging all five senses in his paper "*The Cinema of the Future*" (Carmigniani & Furht, 2011; Berryman & Hoy, 2012). Only four years later, Ivan Sutherland invented the first head-mounted device with the purpose of enhancing reality with computerized information, which is now considered to be the first AR system (Rouse, et al., 2015; Carmigniani & Furht, 2011; Berryman & Hoy, 2012).

Further attempts at building AR systems were made in the following years, but it was only in the late 1990s with the rise of the digital age and its technological progress that AR started to gain momentum (Rouse et al., 2015, Craig, 2013). It was also around that time that the term "*augmented reality*" was coined by Tom Caudell and David Mizell who were designing a head-mounted digital display facilitating the work of *Boeing* factory workers. (Carmigniani & Furht, 2011; Berryman & Hoy, 2012). Technological advancements such as real-time information processing or enhanced camera functionality speeded the development of AR systems along. By 2005, several media outlets were predicting the success of AR solutions, and since then there has been an increasing number of AR applications available (Carmigniani & Furht, 2011; Berryman & Hoy, 2012). In 2007, the first medical applications were being developed and in 2008 the first AR travel guide was launched by *Wikitude* (Berryman & Hoy, 2012). Moreover, due to the emergence of mobile devices, AR has become more widely available and consequently an increasing number of AR applications is being released (Carmigniani & Furht, 2011; Liao, 2015).

3.3. Augmented Reality in marketing

Up until recently, AR has been mainly used in the entertainment, health and education sectors (see section 1.2). However, since a few years using AR as a marketing tool has risen in popularity and consequently an increasing number of brands have begun employing AR in their marketing efforts (Yaoyuneyong, 2016). After all, AR presents marketers with an innovative way to create immersive brand narratives and enables consumers to experience products in new ways (Scholz & Smith, 2016; Yaoyuneyong, 2016; Javornik, 2016). AR offers a dynamic solution for introducing branded content within consumers' social and physical environments and for interacting with the user in a manner that inserts branded content into their conversations (Scholz & Smith, 2016).

O'Mahony (2015) further admonishes that AR possesses some unique characteristics that make it valuable for marketing purposes. For one, he maintains that AR is a medium performing extremely well on the media richness scala (O'Mahony 2015; Maity & Dass, 2014). Other researchers, such as

Azuma (1997) and Javornik (2016) confirm that AR allows the transfer of what O'Mahony (2015: 231) calls a "*new quality of information*". He also praises the simplicity of the communication AR provides, arguing that AR interaction is usually intuitively understood by consumers (O'Mahony 2015). It is this interaction in which he really sees the value of AR. He states that the interactivity level of the AR system serves as a gamification factor for the AR experience, which in turn makes it possible to really engage the consumer (O'Mahony 2015). Moreover, this interaction gives AR marketing the power to put the product in the hand of the users (Woods, 2009: 37), allowing consumers to virtually try out products before purchase and providing them with an opportunity to connect with the brand (Owyang, 2010).

Additionally, O'Mahony (2015) praises the utility and convenience of AR, which is especially high if the AR system is implemented on a mobile device. Typically, contemporary lifestyles no longer allow consumers time to interact with a brand through marketing (O'Mahony, 2015). However, thanks to the nature of mobile devices mobile AR campaigns can be brought with the consumer to whichever location he is visiting and be employed on the go, e.g. on public transport (O'Mahony, 2015; Lonergan and Hedley, 2014).

In general, the fact that AR can be implemented on mobile devices reinforces its potential for marketing. Most consumers today own a mobile device, and consequently do not have to invest in new technology in order to access AR applications, which puts AR in a much more advantageous position regarding its adoption from the consumer side compared to VR (O'Mahony, 2015; Craig 2013). Furthermore, through mobile AR solutions marketers are always connected with consumers, are able to generate location-sensitive offers and can send relevant personalized messages (Berman, 2016). Consequently, it can be argued that mobile AR makes it possible for marketers to leverage the fact that AR allows personalized marketing thanks to its close integration of the consumer's specific location (O'Mahony 2015).

Once a marketer has recognized the potential of AR for marketing purposes, the decision on which type of AR the brand should employ remains to be made. The devices which are most commonly used for AR marketing are mobile smart devices or large interactive screens, which will enhance the physical reality by overlaying virtual elements on persons, objects or spaces (Javornik, 2016; Scholz & Smith, 2016). The augmentation of a person can enhance someone else, e.g. through AR glasses, or it can augment the user's self, e.g. through virtual mirrors or virtual try on. A product, on the other hand, can, for instance, be augmented when the user scans the item, while a physical space could be enhanced by adding virtual elements or concealing real ones (Javornik, 2016; Craig, 2013)

Further, Scholz & Smith (2016) identified four common types of AR uses in marketing: Active Printing, Bogus Windows, Geo Layer Applications and Magic Mirrors. Active Printing, often also called AR hypermedia print ads, are typically AR campaigns that are triggered by consumers scanning an image, which has been layered with AR content and hyperlinks, with their mobile devices (Yaoyuneyong, 2016; Scholz & Smith, 2016). The Greek chocolate brand *Lacta*, for example, allows customers to augment their chocolate bar's wrapper with private messages that they can then share with friends and loved ones (TheNextWeb, 2012). Bogus Windows solutions instead, rely on large screens such as TV screens to augment the space in view of the user with digital objects and thus create the illusion of looking through a window into a different world (Scholz & Smith, 2016). For instance, *Pepsi Max* created such a bogus, or fake, window in bus shelters in London by augmenting the street view with fantastic images such as UFOs landing and tigers walking along the street (MarketingSociety, 2014). Geo-Layer Applications, on the other hand, are usually prompted by the user's own device and enhance the space around the user with digital objects that may or not be linked to specific geo-locations (Scholz & Smith, 2016). With the help of the AR app *BOSify your world*, which ice-tea producer BOS launched, consumers have the possibility to plant a virtual tree on the street and find trees planted by other people (Memeburn, 2013). Finally, Magic Mirror solutions allow users to see themselves as part of the augmentation (Scholz & Smith, 2016; Javornik et al. 2016). *Timberland* made use of this form of AR in a mall

campaign in which users could virtually try on clothing and shoes using digital screens in shop windows (Lemon&Orange, 2014). In our research, we will focus mainly on the two latter types of AR - magic mirrors and geo-layer applications - as we believe these are high potential solutions, because the technology behind them is easy to understand and transferable to mobile devices, which makes them accessible to the majority of consumers. Therefore, we believe that these two application forms are more likely to be adopted by consumers, and therefore of bigger interest to marketers.

In conclusion, it can be said that a large application opportunity of AR lies in marketing, as retailers can use AR to engage customers by enhancing their experience through "*virtual trial and product education*" (Rese et al., 2016: 2). Further, by presenting additional product information in terms of virtual content, AR apps can support consumers in their purchase decision in a fun and interactive way (Rese et al., 2016; Javornik, 2016).

3.4. Augmented Reality user experience

Seeing as AR is an interactive medium, it is important to consider the consumer's user experience with the AR application, when examining AR's impact on search and evaluation behavior. Alben, (1996: 1) defines user experience as "*All the aspects of how people use an interactive product: the way it feels in their hands, how well they understand how it works, how they feel about it while they are using it, how well it serves their purposes, and how well it fits into the entire context in which they are using it"*. Consequently, offering a challenging and pleasurable user experience has become the main aim when designing a strategy for interactive products and services, particularly when they include technological elements like AR (Olsson & Salo, 2012).

Olsson & Salo (2012) have studied AR user experiences in detail and discovered that both pragmatic and emotional drivers influence the overall experience. These findings correspond with the general model of user experience Hassenzahl (2005) puts forth. He suggests that both pragmatic and hedonic attributes of a product, combined with situational circumstances, impact how the user perceives the experience and thus trigger appeal, pleasure and satisfaction. In this model, he

describes the pragmatic quality of a product as the product's capability to sustain the achievement of behavioral goals, such as usefulness, usability, and appropriateness. Conversely, hedonic quality refers to the product's ability to stimulate personal growth, to express one's personality through the product, and to evoke memories and emotions (Hassenzahl, 2005).

Particularly, emotional elements play a great role in using AR as they initiate behavior, trigger decisions and move the attention to what is perceived as interesting, discarding the unsatisfying (Olsson & Salo, 2012). Hence, the type of emotions triggered by the AR application will greatly impact the user experience. Olsson and Salo (2012) further identify that the level of satisfaction experienced with an AR application will largely depend on the sense of efficiency in carrying out information acquisition tasks, the perceived empowerment with new possibilities, and the awareness of surroundings elicited by the AR application. A sense of efficiency can be prompted by aspects such as saving time and effort and feeling supported by the technology when searching for information. The ease of interaction, the acquisition of content connected to the user's current location, and the perceived overall usefulness of the application further contribute to the user experience (Olsson & Salo, 2012). Empowerment, on the other hand, is triggered when the user is provided with new and creative opportunities and tools to find and use information, and consequently feels in control (Olsson & Salo, 2012). Finally, the fact that AR content is location-based and has the potential to make the user see his familiar environment in a new and novel way affects the AR user experience (Olsson & Salo, 2012).

However, in order to provide an enriching AR user experience, AR applications need to offer a high level of precision and accuracy in tracking and embedding augmented information. One of the key challenges in AR is placing a virtual object in the correct place within the augmented space (Azuma, 1997). Therefore, it is important to utilize the best tracking methods in order to offer a powerful experience and avoid registration issues. Two types of registration errors typically emerge in AR: static errors, which emerge from inaccuracies of sensory devices, and dynamic errors, which occur when there is poor synchronization between the software and the camera motion (Nee et al., 2012;

Azuma, 1997). Consequently, the technological equipment and software supporting the AR application should be of high quality to boost the AR user experience.

Overall, registration is a key driver for an effective and rewarding user experience, as it contributes to the vividness of the user experience, i.e. the ability of a technology to produce a sensorial rich mediated environment (Craig, 2013; Steuer, 1992). According to Javornik (2016) a high level of vividness, or realness, will create immersive brand involvement and positively influences how consumers perceive the user experience. This is where the real power of AR lies. No other media has the potential to create experiences, which feature immersion to such a degree. However, the level of immersion will vary from consumer to consumer, as the user experience is subjective and results from the interaction between the user and the technology, which in turn is dependent on contextual factors like social setting, cultural influences and user's other activities (Olsson & Salo, 2012). Therefore, when constructing an enriching AR user experience, marketers must be aware that user experiences are complex constructs which are affected by the user's inner state, the product characteristics and the context of use (Hassenzahl & Tractinsky, 2006).

Another factor affecting the AR user experience is related to the fact that AR is still considered to be an innovation, and thus is perceived as novel. As Olsson & Salo (2012) argue novelty has a strong impact on the user experience, particularly for first time users, as it generates fascination, positive amazement and interest. Further, Poushneh and Parraga (2017) state that novelty can motivate consumers to adopt a technology, they might not otherwise use. Hence, we maintain that when studying AR the influence of novelty has to be taken into consideration.

Finally, it remains to be remarked that a satisfying user experience with AR will positively impact the consumer's overall brand experience (Poushneh and Parraga, 2017). According to Poushnesh and Parranga (2017) an AR-enriched consumer experience empowers users to efficiently perform their tasks and better enjoy the functionality of a product. Further, it is considered to be more entertaining and allows potential customers to continuously interact with virtual information. Therefore, AR

enhances the hedonic value of the consumer experience, which then will generate higher user satisfaction and a higher intention to purchase (Poushneh and Parraga, 2017).

Chapter 4: Consumer decision-making process

Within this chapter, we explore the concept of consumer decision-making and the process consumers generally undertake when making a decision. We touch upon how consumers typically buy cosmetics and furniture, as well as the effect the rise of the Internet had on how consumers make purchase decisions.

4.1. Consumer decision-making

Consumer decision-making as a research field emerged in the eighteenth century, when economists began to question how consumers chose a specific product from a range of similar, alternative products (Mandl et al., 2010). Since then, several disciplines, such as marketing, consumer behavior, psychology, sociology, computer science and artificial intelligence, have attempted to uncover how consumer decision-making works (Roozmand et al., 2011, Rezaei, 2015). Yet, even though most authors limit themselves to analyzing decisions with well-defined boundaries, i.e. simple decisions between alternative products that do not entail far-reaching consequences or obligations in the future, consumer decision-making is still not understood completely (Shocker et al.1991)

Various models investigating consumer decision-making have been developed over time – some of which focus primarily on strategies consumers use in decision-making, while others concentrate on the process of making a purchase decision (Zeithaml, 1988; Nicosia, 1966; Sprotles & Kendall, 1986; Henry, 2005). The former type of model describes consumer decision styles or strategies (CDS), i.e. decision-making methods consumers use based on their mental orientation towards decision-making (Sprotles & Kendall, 1986; Rezaei, 2014). CDS differ in the amount of information considered

in total and for each alternative, as well as in the way information is processed, i.e. how the alternatives are evaluated against each other (Bettman et al., 1998). The latter type of model, on the other hand, describes the consumer decision process (CDP), which Shocker et al. (1991) define as the process by which an individual decision-maker arrives at a purchase decision. The CDP is commonly thought to consist of a pre-purchase phase, in which the consumer has to choose from a set of alternatives, the actual purchase, as well as a post-purchase phase, in which the purchased brand is consumed and the overall experience is evaluated (Bettman et al., 1998). Unlike CDS, the CDP is independent of individual characteristics, such as personality, gender, or culture, and is, therefore, more suitable for research focusing on the general consumer (Sprotles and Kendall, 1986; Mishra, 2013; Solka & Jackson, 2011).

4.2. Key concepts in consumer decision process literature

The CDP has been a focal area of interest since the 1970s and numerous theories about the CDP have been developed over the years (Bettmann et al., 1998). This section aims to review the most important CDP literature in an effort to elicit some common aspect, which will give us a better understanding of the context of consumers' search and evaluation behavior during their decision-making.

4.2.1. Phases of the consumer decision process

One feature most researchers agree upon is that the CDP can be divided into several stages, though opinions differ on what exactly these stages constitute. Nicosia (1966) proposes a model with four phases, or fields as he calls them. He postulates that first a message is sent from the firm to the consumer, who will then search for and evaluate the brand as well as its alternatives in what Nicosia (1966) calls the Pre-action Field. Next, the consumer will purchase the chosen alternative. In the final phase, the Feedback Field, the experience with the brand is stored in memory for future decisions regarding the brand (Nicosia,1966).

These phases are similar to the ones described by the most frequently cited and adapted CDP model in consumer behavior literature, called the Engel-Kollat-Blackwell (EKB) model. It describes the CDP as consisting of five steps: need recognition, information search, alternative evaluation, purchasing process and post-purchase evaluation (Kollat et al., 1970; Hansen, 2003; Rezaei, 2014; Thompson & Yeong, 2003). According to the EKB model, a consumer will first recognize a problem or need due to an external or internal stimulus, which will then activate him to take action, i.e. to seek information about how to satisfy his need (Krohmer, 2012; Kollat et al., 1970). Based on this information search the consumer will narrow down his options to a set of preferred alternatives, which Shocker et.al. (1991) call the consideration set. In the next phase, these alternatives are evaluated with the help of the information gathered in the search phase as well as based on past experiences, and the alternative which is perceived to fulfill the consumer's needs best is chosen and then purchased. In the final phase, the experience with the brand both during the first four phases and during consumption is evaluated and stored in the brain for future use. (Kollat et al., 1970; Thompson & Yeong, 2003)

Due to its generality and the possibility to apply it to a wide range of situations, this model has been widely adapted in CDP literature, and several authors have based their research on the phases described in this model (Hansen, 2003; Rezaei, 2014; Thompson & Yeong, 2003; Burdett et al., 2013). They provide the foundation for most CDP research and support the purchase funnel paradigm, according to which consumers go through the CDP in a rather linear fashion, narrowing down their alternatives until they arrive at one (Shocker et al., 1991; Nicosia, 1966; Krohmer, 2012).

4.2.2. Consumers with limited cognitive capacity

The second common aspect we found concerns the cognitive capabilities of consumers. In the beginning of CDP research, authors were heavily influenced by neo-classical economics and their belief of a rational consumer (Erasmus et al., 2001). Consequently, earlier CDP models were based on the so-called rational choice theory, which assumes that consumers have perfect knowledge

about all available alternatives and will choose the product that maximizes their satisfaction (Mishra & Olshavsky, 2005; Mandl et al., 2010; Bettmann et al., 1998). In the 1970s, however, researchers began to criticize the assumption of a rational all-knowing consumer and a new theoretical perspective, called the information processing perspective, emerged (Mishra & Olshavsky, 2005). This perspective characterizes the CDP as a cognitive process, highlighting the fact that consumers are limited in their capacity to process information and therefore cannot make perfectly rational decisions (Mandl et.al. 2010; Bettmann et al., 1998; Hansen, 2003). This notion of limited cognitive capacity, which is often referred to as bounded rationality, has had wide-reaching implications for CDP research (Simon, 1956; Mishra & Olshavsky, 2005; Mandl et al., 2010).

Research has shown that providing consumers with more information than they can process decreases the quality of their decision-making (Malhorta, 1982). At the same time, however, consumers do need to extend a certain level of mental effort into searching for and evaluating alternatives, in order to make an accurate choice that will satisfy all their needs (Bettmann et al., 1998; Mishra & Olshavsky, 2005). Much attention has been paid to how consumers deal with this accuracy-effort trade-off in CDP literature. Simon (1956) states, that rather than attempting to maximize their satisfaction, consumers will make a satisficing decision, meaning they will chose the first product they encounter that meets all their needs. Bettmann et al. (1998) expand on this idea and argue that consumers make use of choice heuristics when making purchase decisions. Many consumers, for example, tend to make habitual purchases or simply purchase the most well-known brand in an effort to decrease the mental strain (Henry, 2005).

4.2.3. Cognition and emotion

Finally, it seems that most CDP researchers agree that consumer decision-making is influenced by both cognitive and emotional considerations (Nicosia, 1966; Erasmus et al., 2001; Dholakia et al., 2010). Several studies argue that these two elements influence the relative attitude of the consumer, which in turn drives the purchase intention, while others have found cognitive and emotional factors

to affect the consumer's information search and alternative evaluation (Raj & Roy, 2015; Nicosia, 1966; Chang & Wu, 2012; Dick & Basu, 1994).

The cognitive aspect of decision-making is very much in line with the beliefs of the rational choice theory (Raj & Roy, 2015). While passing through the CDP, consumers engage in deliberate, controlled and goal-directed information-processing and behavior, which requires them to allocate some mental effort and processing resources to the task (Shiv & Fedorikhin, 1999; Erasmus et al., 2001). This allows them to make close-to-rational decisions (Mishra & Olshavsky, 2005). However, their decision-making is also influenced by a less deliberate, more automatic mental process, which some researchers refer to as affect (Shiv & Fedorikhin, 1999). This affective mechanism requires a lot less effort and is prompted by the consumer's emotions. According to the Affect-As-Information model consumers frequently rely on their emotions, instead of external sources of information, to quickly form an opinion about a brand (Krohmer, 2012). Other researchers, however disagree and state that highly emotional decisions are commonly accompanied by more active search behavior (Raj & Roy, 2015). Bettmann et al. (1998), for example, found that decision-makers, which were under the influence of intense emotions, often engaged in more extensive and selective information-processing.

One possible explanation for these findings could be that highly emotional people are generally also highly involved in the decision-making process (Krohmer, 2012). Consumer involvement can generally be defined as a special type of consumer activation which focuses on search, evaluation and storage of information (Krohmer, 2012). A highly-involved consumer will care more about the outcome of his decision and will thus spend more energy and time on searching for the perfect solution (Hansen, 2003). Moreover, depending on the type of purchase decision that needs to be made, a consumer can exhibit either cognitive involvement, meaning he shows interest in thinking and learning about the product, or emotional involvement, i.e. the consumer exhibits particular feelings towards the product (Krohmer, 2012).

Some authors expand on this view of emotional and cognitive dimensions to also include contextual or social factors (Dick & Basu, 1994). Most prominent among these models is the Ajzen/ Fishbein model, which maintains that all behavioral intentions, including purchase intentions, are driven by two key factors: the consumer's attitudes towards the behavior, meaning his subjective evaluation of the behavior and its consequences, and the consumer's attitude towards the subjective norms connected to this behavior (Kromer, 2012; Fredricks & Dossett, 1983). Subjective norms, they argue are determined by the individual's motivation to comply with what is socially desirable (Fredricks & Dossett, 1983).

4.3. Consumer decision-making in the cosmetics and furniture industry

This distinction between emotional and cognitive processes in consumer decision-making is also reflected in the purchase process of consumers in the cosmetics and furniture industries. When buying cosmetics consumer generally make decisions based on more emotional considerations, while consumers buying furniture engage in more cognitive processes.

4.3.1. Buying cosmetics

When buying cosmetics, consumers typically consider factors such as brand name, product quality, price, and service quality (Pervin et al., 2014). Yet, in recent years, cosmetics retailers found consumers to vary their behavior more often, considering different brands and fluctuating with regard to their price sensitivity (Shapouri, 2016). Nonetheless, buying beauty products is a process that not only serves rational needs, but also relies strongly on emotions (Science Daily, 2011). Research showed that one of the main reasons consumers purchase cosmetics is to feel good and create the perception of caring for themselves (Science Daily, 2011; A.T.Kearney, 2017). Hence, cosmetics are frequently bought out of affect, without the consumer investing a high amount of time in searching among the products (Wu & Lee, 2016). However, this does not necessarily translate into the cosmetics purchase decision being a low involvement decision. Depending on the individual characteristics, the consumer can be highly engaged and involved in selecting the right makeup

product, or conversely completely disinterested (Wu & Lee, 2016). Based on these considerations, we argue that buying cosmetics can be classified as an emotionally involving decision, which depending on the consumer consists of high to low involvement (Vaughn, 1980).

A report from A.T. Kearney (2017) found that online purchasing of cosmetics is on a steady rise. Nevertheless, industry experts agree that testing products physically is still essential for most consumers (Shapouri, 2016). Consequently, the majority of cosmetics are still bought in person, as websites do not typically provide the users with a testing option. However, brands indicate that they experience an increasing number of customers researching which products they want to purchase online before coming into the store (Shapouri, 2016). Particularly beauty bloggers and social media influencers have gained influence on consumers' purchasing behavior (A.T. Kearney, 2017). AR applications have the potential to meet consumers' need for testing with online research and accessibility, letting them try their preferred cosmetics without leaving the comfort of their homes and allowing them to save time.

4.3.2. Buying furniture

When consumers consider buying furniture they go through the normal CDP, described in section 4.2. They first recognize their need for new furniture, which is typically related to a move, change in home decoration or due to worn out or damaged furniture (Lihra & Graf, 2007). Next, they engage in the search for and evaluation of alternatives. Factors consumers frequently take into account when buying furniture include product material, style, size, guarantees and warranties, and price (Labuschagne et.al. 2012). As furniture is a higher priced product, not bought frequently and an essential part of one's home, i.e. constituting an important part of a consumer's identity, consumers are generally highly involved cognitively in making this decision, which leads them to putting a lot of effort into the pre-purchase phase (Labuschagne et al., 2012; Vaughn, 1980).

Lihra & Graf (2007) found that consumers highly valued seeing and touching the furniture in their search and evaluation. Consequently, visiting the physical furniture store remained to be of critical

importance in their decision-making (Lihra & Graf, 2007). Moreover, participants of this study highlighted that they were not able to find sufficient information online. These findings suggest, replacing physical stores with virtual showrooms is not yet an accepted practice. However, AR applications could complement the store visit with geo-specific information personalized to the individual's home, and thus, could facilitate the extensive pre-purchase phase of the furniture purchase decision.

4.4. Impact of the digital age on consumer decision-making

Though decision-making in the cosmetics and furniture industry have largely stayed the same for the last decades, our exploration in section 4.3 demonstrates a looming shift in consumer decision-making due to new technologies. More specifically, with the rise of the Internet consumers began to change their behavior, including how they make decisions. This section highlights the major changes research has identified in the CDP due to the rise of the digital age. First, we will explore how the conditions and surroundings of the consumer changed through the advent of the Internet. Then we will look at some concrete consequences these changed conditions have on the CDP and search and evaluation activities.

4.4.1. Changed conditions for consumer decision-making

The most significant change the digital age brought around was that it allows the consumer easy access to information. Thanks to the Internet combined with powerful search algorithms like Google and the mainstream adoption of mobile devices, consumers can literally access any piece of information at any time from any place without any major effort (Shankar et al., 2011; Burdett et al., 2013; Fulgoni, 2014). Thus, it has become much easier for the consumer to search for and compare brands (Pantano & Naccarato, 2010). Simon (1956) described his concept of bounded rationality to be based on three assumptions: individuals having limited knowledge, information being costly to collect and store, and economic behavior requiring a trial-and-error search process (Mishra & Olshavsky, 2005). In light of the ease with which consumers can now retrieve information, these

assumptions appear to be less valid in the digital age. Consequently, one could argue the consumer to no longer be limited by bounded rationality, but to have transitioned to a state of "*unbounded rationality*", in which he possesses the ability to make better choices more easily (Mishra & Olshavsky, 2005).

Additionally, the consumer's power in the decision-making process has been increased through the fact that consumers no longer have to rely solely on the company's messages to evaluate a product (Hudson & Thal, 2013). The Internet and particularly social media have made it a lot easier for consumers to communicate with each other and to exchange views and evaluations of brands (Hudson & Thal, 2013). Research has proven that consumers value such word-of-mouth as an authentic source of information and expertise and that it is often considered to be more trustworthy than traditional sources of information (Wang & Yu, 2015).

These developments allow the consumer to make more informed choices and thus gives him more control over his decision-making (Henry, 2005; Pantano & Naccarato, 2010; Treadgold & Reynolds, 2016). However, that does not entail that decision-making has become easier for the consumer. Quite to the contrary, decision-making has never been this complex (Razaei, 2014). The pace of decision-making has picked up considerably, aided along by the omnipresent access to information and products (Shankar et al, 2016). Consumers now have to do more in less time, and thus no longer have the luxury of taking their time to make decisions (Henry, 2005). Furthermore, the Internet supported by deregulation and globalization has created ideal conditions for companies to enter a new market and for entrepreneurs to start a business (Shankar et al., 2011). As a consequence, the competition worldwide has risen tremendously and consumers can now choose from a much wider range of brands than ever before (Treadgold & Reynolds, 2016; Bedi & Lai, 2014; Henry, 2005). This, however, also means that they need to take more time to search for more information and evaluate all their alternatives (Henry, 2005).

Moreover, the heightened competition leads companies to put more emphasis on advertising. No matter where the consumer goes, if offline or online, he is bombarded with company messages clamoring for his attention (Bedi & Lai, 2014; Henry, 2005). This expanded scope of information can easily lead to information overload and dysfunctional decision-making, as consumers only have limited processing capacity (Malhorta, 1982; Henry, 2005). Miller (1956) found that the average person can only hold five to nine pieces of information in working memory. In order to deal with the huge amount of information they receive on a daily basis, consumers have become very adept at filtering out what they perceive as irrelevant information and are quicker to resort to choice-heuristics (Henry, 2005). This, in turn, means companies need to get a lot more creative in how they reach out to consumers, especially as they begin to encounter the newer generations of digital natives and digital dependents, who have grown up in the digital age and have thus developed natural defense mechanisms against the onslaught of information (Burdett et al., 2013; Shankar et al., 2016). AR has the potential to be such an innovative new channel of communication, which might break through the multitude of information consumers face every day. Therefore, it is essential for brands to gain an understanding of how AR can help them engage consumers and meet the shift in consumer expectations and behavior the digital age has brought about (Burdett et al., 2013).

4.4.2. A more dynamic consumer decision process

As a consequence of these new conditions under which consumers find themselves, consumers have changed the way they make decisions, i.e. their CDP. They no longer follow the linear process traditional CDP models describe, moving in a kind of funnel from one phase to the next, narrowing down their choices (Burdett et al., 2013; Court, et al., 2009; Treadgold & Reynolds, 2016). Instead researchers find that consumers now shift back and forth between CDP phases, simultaneously searching and evaluating their options, adding and subtracting alternatives as they discover new information (Court et al., 2009; Shankar et al., 2016). As such, brands no longer have to fight to be part of the consumer's initial consideration set, but can also 'disrupt' the consumer while he is already in the CDP (Court et al., 2009). Moreover, the importance of feedback resulting from the post-

purchase phase has increased with the possibility of easily sharing opinions with other consumers online (Wang & Yu, 2016; Court et al., 2009). Thus, rather than consisting of five linear stages, the CDP can now better be described as a circular journey without a starting or ending point, consisting of three broad phases: pre-purchase, purchase, and post-purchase (Shankar et al., 2016; Hudson & Thal, 2013). Burdett et al. (2013) describe it as shifting from the purchase funnel to a 'purchase fish', in which consumers engage in a world of constant feedback and search with multiple touchpoints across various channels.

It is important to highlight that consumers take a much more active role in this new CDP, or consumer decision journey (CDJ), than they used to. Consumers are too well informed and have easy enough access to alternatives to accept being treated as conforming shoppers (Treadgold & Reynolds, 2016). They no longer passively receive brand messages, but take on an active role in pulling information from various sources towards them (Court et al., 2009; Treadgold & Reynolds, 2016). Fulgoni (2014), for example, found that in December 2013 more than 200 million consumers in the US visited retail websites, making on average 26 visits per visitor. These numbers demonstrate that consumers do not wait for the company to reach them with a marketing message any longer, but proactively search for brand information whenever they feel like it. Moreover, thanks to the ease with which consumers can now communicate with each other, consumers are also found to shape brand messages themselves and co-create brand meaning, as, for example, the emergence of brand communities shows (Gensler et al., 2013). According to Court et al. (2009) nearly two-thirds of all touchpoints during the pre-purchase phase now involve consumer-driven activities such as word-of-mouth or online reviews.

Overall, one could argue that the pre-purchase phase, in which consumers engage with the multitude of information and touchpoints they generally encounter nowadays, is the most relevant phase of the CDP for marketers to understand. Companies need to be able to recognize how consumers interact with the various brand channels and how this interaction influences their decision-making. In relation to AR, this is also the phase in which the consumer will presumably interact and engage

the most with branded AR applications (Bulearca & Tamarjan, 2010; Javornik 2016). Therefore, our research will focus solely on the search and evaluation, or pre-purchase phase of the CDJ, i.e. the search and evaluation.

4.4.3. The importance of an omni-channel experience

As part of this more dynamic CDJ, consumers constantly shift back and forth between physical and digital channels while making a purchase decision (Treadgold & Reynoldy, 2016; Badot & Lemoine, 2014; Dholakia et al., 2010). They might search for information on a product online, then go to a bricks-and-mortar store to look at the product, while at the same time comparing prices on their smartphone, and eventually buy the product in the shop's e-commerce store in order for it to be delivered home.

The digital age has made it possible for consumers to freely choose those channels that offer them the highest value, e.g. in terms of convenience, enjoyment or time saved, at any given moment (Cook, 2014; Treadgold & Reynoldy, 2016). Each channel will provide consumers with a different experience and will, thus, satisfy other needs. Dholakia et al. (2010) maintains that customers choose channels that satisfy economic, self-affirmation, symbolic meaning, socialization and experiential, or routine and maintenance goals. However, the type of goal a consumer wants to achieve with his channel choice may vary considerably depending on which stage of the CDJ and situation he currently finds himself in (Shankar et al., 2011; Dholakia et al., 2010). Consequently, consumers are found to switch from one channel to the next quite frequently during the CDJ (Dholakia et al., 2010).

Taken together the brand touchpoints across these various channels constitute the consumer's brand experience, and will ultimately determine whether a consumer will consider repeat purchases of the brand (Dholakia et al., 2010; Gentile et al. 2007; Andajani, 2015). According to Pine & Gilmore (1998) experiences are becoming increasingly important to consumers. Whereas products and services are external to the consumer and can serve a mere utilitarian function, experiences, by

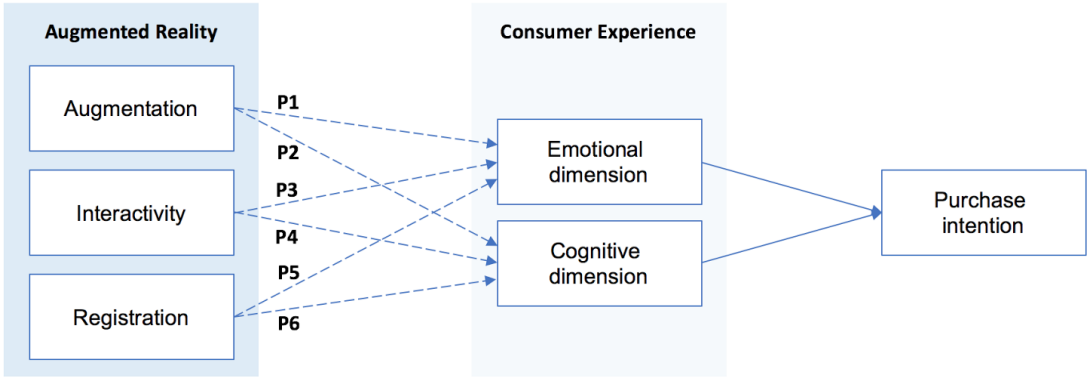
definition, create memorable moments, which are internal to the consumer and thus highly personal (Pine & Gilmore, 1998; Andajani, 2015). As such, experiences have the ability to engage and involve consumers on an emotional and spiritual level and allow them to build a relationship with the brand (Gentile et al., 2007). Consequently, a positive experience can stimulate customer satisfaction and loyalty and is, thus, of outmost importance for a brand (Cook, 2014).

How the brand experience is evaluated will depend heavily on the consumer's expectations towards the brand, and nowadays, consumers expect the brand experience to be seamless across all channels (Gentile et al., 2007; Cook, 2014; Fulgoni, 2014). They expect to encounter consistency throughout all touchpoints, to find the same offerings, prices and messages independent of through which channel they choose to engage with the brand (Cook, 2014). Unlike many brands consumers do not separate their experience according to channel, but rather think of it as a ubiquitous or meta-experience (Badot & Lemoine, 2014). Hence, any friction or discrepancy might lead to the consumer choosing an alternative brand instead (Fulgoni, 2014). Moreover, consumers have come to demand the brand to remember them across channels and receive offers tailored to their personal brand history and preferences (Burdett et al., 2013; Fulgoni, 2014). Therefore, companies today need to design omni-channel experiences, in which each channel has value to offer to the overall brand experience (Badot & Lemoine, 2014). This is important for brands to remember when considering the use of branded AR applications. Though AR only constitutes one channel and one touchpoint, it needs to fit into the ubiquitous brand experience, as the experience consumers have across other touchpoints will influence the experience consumers have within the AR application.

Chapter 5: Conceptual Framework

Within the next chapter, we develop a conceptual framework, which will help us explore the impact AR has on the search and evaluation phase of the CDJ. For this purpose, we will identify drivers of AR as well as key elements of the consumer experience during search and evaluation, which will ultimately impact the consumer's purchase intention. The remainder of this paper will then explore the relationship between those AR drivers and experience dimensions.

Table 3: Conceptual framework



5.1. The three Augmented Reality media characteristics

We have chosen to consider the three AR characteristics Azuma (1997) suggested as the AR drivers – augmentation, interactivity and registration - to guide our study, due to the reason that they are recognized and used by most academics in the field of AR research. Media characteristics like these represent important measurement tools for studying the potential impact of technology on consumers and the possible interaction between the two as they make it possible to identify certain consumer behaviors as direct reactions to the technological feature (Sundar et al., 2015; Li & Meshkova, 2013). Therefore, researchers frequently use media characteristics to investigate consumer responses to a

medium and to understand individual reactions to interactive technologies (Steuer, 1992; Sundar, 2004; Voorveld et al., 2009).

The first AR media characteristic augmentation pertains to the fact that AR enhances the physical environment with virtual information (Billinghurst et al., 2001; Azuma 1997). This characteristic is a key distinguisher of AR compared to other media such as the Internet or television. Augmentation can be achieved through various elements such as text, geo-location information, image, video or audio that is projected into the real world (Fitzgerald et al., 2013; Sharp et al., 2007). Though augmentation in its broader definition does not only refer to the sense of sight, but also to hearing, taste, touch and smell (Carmigniani & Furht, 2011; Azuma, 1997), we will focus only on visual enhancements through AR as most technological development has concentrated on these and they represent AR's most well-developed feature (Javornik, 2016).

The second AR media characteristic, interactivity, is concerned with consumers being able to interact with the medium and its content in real time (Azuma, 1997). In other words, the AR user has the opportunity to react to and possibly change the augmentation, e.g. by moving the augmented object to a different space, or switching his own position in the real world in relation to the augmentation. This feature of AR has been proven to be of particular importance to the AR experience (Hoffman & Novak, 2009). Studies have shown that interactivity impact consumer reactions, for example by generating a sense of immersion, enjoyment and trust (Hoffman & Novak, 2009; Gao et al., 2009).

Finally, the third AR media characteristic taken into consideration is registration. Azuma (1997) describes it as the alignment of the real and the virtual. He states that an AR system needs to show the virtual world in registration with the real world in a way that will lead users to sense the digital elements as part of their physical surroundings. Craig (2013) gives the example of a real and virtual vase in an effort to explain this characteristic. A real vase standing on a table will stay in the same place until a person physically moves it, though an observer can view it from different angles by walking through the room. The same should be true for the augmented vase. The user should be

able to inspect the digital vase from different perspectives without the vase shifting position. The vase should only move, if the AR user decides to actively move it. Of course, as the vase is virtual the user has a lot more options to do so than in reality (Craig, 2013). In conclusion, the virtual content should act as if it really existed in a physical space. If the registration of the augmented object within the physical surrounding is not accurate, the illusion that the real and virtual world coexist is compromised (Azuma, 1997). Achieving high levels of registration remains the biggest challenge in AR design and development.

5.2. The consumer experience during search and evaluation

For the purpose of our research, we will examine how the above-mentioned AR drivers will influence the different dimensions of the consumer experience. As the literature review in section 4.2.3 demonstrated consumers are engaged both emotionally and rationally when searching for and evaluating a product (Schmitt, 1999). However, it also revealed that several CDP models argue that a third dimension, namely the social background and surroundings of the consumer also influence his decision-making (Homburg, 2012). While we do recognize that the social factor does have an impact on the CDP, we will not focus on this aspect as it would exceed the dimensions of this paper.

Hence, this model only considers the emotional and cognitive dimensions of the consumer experience during search and evaluation. The emotional sphere relates to positive and negative emotions generated by the experience, which in turn impact the individual's psychological well-being (Moe, 2003). This is due to the fact that consumption experiences are also directed towards the pursuit of fantasies, feelings and fun (Hirschman & Holbrook, 1982). The cognitive sphere, on the other hand, is concerned with rational processing of information aimed at the fulfilment of the individual's goals and thus stress aspects such as utility and usability (Hassenzahl, 2005). Consequently, this paper argues that the consumer develops a specific purchase intention under the influence of cognitive and emotional factors during search and evaluation. This in turn, will most likely lead to actual purchasing behavior, as according to the Ajzen-Fishbein model the performance

or nonperformance of a specific behavior is determined by the intention to perform that behavior (Fredericks & Dossett, 1983).

Chapter 6: Proposition development

In the following chapter, we develop research propositions based on the three AR media characteristics of augmentation, interactivity, and registration with regards to the emotional and cognitive dimension of the consumer experience in search and evaluation.

6.1. Augmentation and its impact on search and evaluation

The first characteristic of AR, augmentation, concerns the fact that AR inherently augments reality with virtual information. In relation to using AR applications in the marketing context, this feature offers great advantages to the marketer. For one, it ensures that consumers feel immersed in the experience. Parise et al. (2016: 413) define immersion as "*the degree to which the user has a feeling of 'being there.*'" Other researchers also refer to this as presence, or if mediated by technology telepresence (Sheridan, 1995; Steuer, 1992). As AR applications use the actual physical location of the user as its main component, the user cannot help but feel like he is in the AR scene.

Moreover, the augmentation of the real world allows the user to feel presence and telepresence at the same time, which is unique to AR. Other media like television or VR might provide the consumers with a mediated feeling of being there, yet they fail to also give the consumer a natural perception of their surroundings (Steuer, 1992). Consequently, AR is not only a medium with very high media richness, but also has the potential, through its augmentation, to offer a new type of information, which makes it invaluable to marketers (Maity & Dass, 2014; O'Mahony, 2015).

Further, the AR augmentation provides the consumer with a highly-personalized experience. While using an AR application, users interact with the brand in their own context, e.g. in their own living

room or with their own body, which allows the consumer to connect the information provided by the brand directly to themselves. This makes it easier for the consumer to see the relevance of the information (Olsson & Salo, 2012; Shankar et al., 2016). Combined with the interactivity of AR this accumulates to a rich customer experience (Parise et al., 2016).

6.1.1. The emotional impact of augmentation

Researchers have found that augmentation of users' immediate surroundings or even of users themselves generally elicits a feeling of surprise and intrigue when trying AR for the first time (Javornik et al., 2016; Olsson & Salo, 2012). This can be assumed to be the case due to the fact that AR applications have still not been widely adopted by the mainstream and AR augmentation is, thus, still unexpected and novel to the average consumer (Olsson & Salo 2012; Shankar et al.,2016). Once consumers get used to the AR application, however, they still frequently demonstrate a positive feeling of delight at the usefulness of the application and relevance of the information to their personal situation (Olsson & Salo 2012; Javornik et al., 2016).

In general, we assume that particularly the fact that the consumer's personal sphere, e.g. their home, is augmented, generates strong feelings. Javornik (2016) states that the augmentation of a person will enhance the view of that person of themselves. These findings support Belk's theory of '*the extended self*', in which he maintains that consumers regard their possessions as part of themselves and use their consumption experiences to construct their identity (Kunst & Vatrapu, 2014; (Belk, 1988). Hence, adding virtual information to consumers' body or possessions extends and enhances their sense of identity, which in turn triggers positive emotions (Belk, 2013). Moreover, research found that this is especially true when consumers touch products, meaning that smartphone or tablets, which are used for mobile AR applications, are particularly important to the consumer's self and thus to the creation of positive feelings (Brasel & Gips, 2014).

These positive feelings are then associated with the brand. Consequently, the augmentation of the user's self not only creates positive feelings about oneself, but also towards the brand. The findings

of Parise et al. (2016) further support this. They found that personalization frequently results in a positive attitude towards the brand, due to the fact that it signifies to consumers that the brand values and cares about them. These emotions and beliefs are then directly translated into a positive customer attitude and higher satisfaction (Yaoyuneyong, 2016).

As a result, one can assume that the embeddedness of the brand's information in the personal context of the consumer generates positive emotions in the consumer, which will make him evaluate the experience with the brand more positively and ultimately have a positive impact on the consumer's purchase intention. Therefore, we suggest the following proposition for our research:

P1: Augmentation has a positive impact on the emotional dimension of the consumer experience in the search and evaluation phase.

6.1.2. The cognitive impact of augmentation

However, AR augmentation also impacts the cognitive processes a consumer undergoes during the search and evaluation phase of his CDJ. Just like the emotional component of the process, the cognitive dimension is also influenced by the personalization that AR augmentation provides. Research has shown that information that refers to the consumer's self is generally remembered longer and recalled more easily, due to the self's long-term position in working memory (Tam & Ho, 2006; Dick & Basu, 1994). Additionally, Tam & Ho (2006) found that users pay more attention to self-referent content, are less critical of this content and place greater value on it. Consequently, they also reduce the time they spend on decision-making, when faced with information that is relevant to themselves (Tam & Ho 2006).

Conversely, the augmentation of the consumer's personal context also leads to consumers expanding their search activities, e.g. by trying products within the AR application that they would not ordinarily have tried (Javornik, et al., 2016). The reason for this, may, on the one hand, lie in the

positive emotions consumers experience when augmenting themselves, which makes them want to extend their experience (Olsson & Salo 2012). On the other hand, the visual placement of virtual information into their relevant context gives the consumer a better understanding of how the product would fit into his own situation, thus making it easier for the consumer to process the information and reducing the cost of extending one's search (Hugues et al., 2011).

This view is supported by the embodied perspective of cognition, which maintains that human cognition is shaped by the bodily influences of one's immediate physical and social environment (Huang et al., 2013). Wilson (2002) state that people attempt to cope with the limitations of their cognitive capacity by manipulating the environment around them and, thus, expand their cognition by including that environment. The fact that AR visualizes previously non-perceivable information and places this information in the individual's personal environment, is consequently assumed to empower consumers' cognitive processes (Carmigniani & Furht, 2011; Olsson & Salo, 2012). Further, the feeling of immersion the AR augmentation creates increases a feeling of directly experiencing the product, which results in the consumer accepting the information more readily (Dick & Basu, 1994). In a time in which consumers are constantly faced with information overload this is particularly valuable (Henry, 2005).

Moreover, the mere fact that AR applications visualize information makes it easier for consumers to process the information (Samek et al., 2016). Human beings can extract more information from visuals in less time, due to cognitive processes such as feature extraction and pattern perception (Jun et al., 2011). As a consequence, their decisions also become more efficient and effective (Samek et al., 2016). This coincides with the findings of Maity & Dass (2014), who discovered that consumers preferred using channels with high media richness, which often entails visual representations of information, for more complicated tasks. The sense of efficient information gathering and processing gained through these media typically generates a feeling of satisfaction, which in turn makes it easier for the consumer to remember the experience (Olsson & Salo 2012).

Overall, augmentation seems to facilitate information-processing and thus positively impact the cognitive processes of the search and evaluation phase of the CDJ. Hence, we suggest the following proposition:

P2: Augmentation has a positive impact on the cognitive dimension of the consumer experience in the search and evaluation phase.

6.2. Interactivity and its impact on search and evaluation

The AR media characteristic of interactivity has been of particular interest to researchers and is considered essential for assessing digital and virtual media (Steuer, 1992; Lister, 2008). Studies have found that consumer responses to the interactivity of a medium depend on several things, inter alia, on the level of responsiveness of the medium, the perceived degree of control over the medium, and the extent to which it allows consumers to lead a two-way conversation (Song and Zinkhan, 2008; Van Noort, et al., 2012). With regards to AR, the interactivity of current commercial AR apps focuses primarily on interacting with the interface and the digital content rather than on augmented communication between human parties (Javornik, 2016).

Literature on interactivity suggests that interactivity can be studied from two diverse perspectives: the media features perspective and the user perception perspective (Mollen & Wilson, 2010). These two schools of thought differ with regards to what they primarily pay attention to when examining interactivity. In the former, interactivity is regarded in terms of the interface functionalities that allow synchronization of communication. In other words, it focuses on the app features as the drivers of interactivity (Steuer, 1992; Sundar, 2004). The latter, on the other hand, studies how users perceive features of technology during interaction (Liu & Shrum, 2002; Song & Zinkhan, 2008), and thus emphasizes the perception as the crucial factor in understanding the user experience with technology (McMillan & Hwang, 2002; Cyr et al. 2009; Voorveld et al., 2009). To acquire a more

accurate understanding of interactivity's impact on search and evaluation, these two perspectives must be integrated, hence allowing the causal effect to be examined (Van Noort et al., 2012).

One concept that should be considered when studying interactivity is the concept of flow, which is described as the immersion of consumers into a highly absorbing state when using interactive features (Van Noort et.al., 2012; Csikszentmihalyi, 1997). The importance of flow lies in the fact that it can improve learning, establish perceived behavioral control, increase exploratory and participatory behavior and create positive experiences. Moreover, such immersive experiences can influence consumers' brand attitude, their cognitive responses, behavioral and emotional intentions to use the app again and purchase intentions (Van Noort et al., 2012; Huang, 2015; Javornik, 2016). However, it is important to note that the influence of interactivity will vary depending on how often the consumer has used the interactive technology. Studies have shown that consumer's attention shifts towards the perceived utility of the application the more they use it, meaning they increase their focus on goal-oriented activities rather than on the experiential ones (Hoffman & Novak , 2009).

6.2.1. The emotional impact of interactivity

Interactivity in general, and particularly 3-D based interactivity, has been found to greatly impact consumers' emotions and thus enrich the consumer experience (Hyun & O'Keefe 2012; Spreer & Kallweit, 2014). Research discovered, for example, that the characteristic of interactivity in digital technology provides the user with a feeling of control over his experience, which in turn makes him feel more satisfied (Parise et al., 2016; Poushnesh & Vasquez-Parraga, 2017). This feeling of satisfaction has also been contributed to the fact that interactivity facilitates the activation of vivid memories within the consumer, which according to Dholakia et al. (2010) then influence the consumer's level of satisfaction with the experience (Huang, 2015).

Moreover, 3-D based interactivity, such as the interactivity AR provides, is considered to serve an entertaining function (Poushnesh & Vasquez-Parraga, 2017). Huang (2015) determined that highly interactive AR experiences caused users to demonstrate high degrees of active playfulness and

made them feel more positive about their experience. This is confirmed by further AR research which asserts that the interactivity of AR elicits feelings of satisfaction, enjoyment, trust and immersion (Javornik, 2016b; Hoffman & Novak, 2009; Poushnesh & Vasquez-Parraga, 2017). Hyun & O'Keefe (2012) revealed in their study that the feeling of immersion increased the more users were able to interact with visual- and auditory-based mediums such as AR. In turn, the more immersed consumers get in the experience, the more pleasurable they perceive the experience (Huang, 2015).

Based on these findings, we assume that interactivity has a positive impact on the emotional dimension of the consumer's experience. Thus, we advance the following proposition:

P3: Interactivity has a positive impact on the emotional dimension of the consumer experience in the search and evaluation phase.

6.2.2. The cognitive impact of interactivity

The way in which individuals are able to interact with data highly influences their process of information search (Samek et al., 2016). Huang (2015) discovered that interacting with AR allows consumers to recall previous consumption experiences more easily. These memories act as a starting point for decision-making and enhance consumers' explorative consumption behavior (Huang & Tseng, 2015). The findings of other researchers confirm the positive effect of interactivity on consumers' exploration (Hoffman & Novak, 2009; Yaoyuneyong, 2016). Samek et al. (2016) ascertained that consumers would increase the number of options they consider, when using interactive technology during their information search, while Yaoyuneyong (2016) argued that interactivity increased consumer engagement and involvement, which in turn generally leads to a more active search behavior (Krohmer, 2012). Moreover, interactivity has been found to cause a deep feeling of immersion, which induces consumers to focus intently on their consumption activities and makes them lose any sense of time (Hyun & O'Keefe, 2012; Huang, 2015).

Furthermore, interactivity seems to assist consumers with processing information. Häubl & Trifts (2000) examined how interactive tools supported consumers during evaluation and found them to be of value both during an initial screening of alternatives and during a more detailed comparison leading up to a purchase decision. They additionally identified a notable positive effect of such tools on the efficiency of the decision-making and on the quality of the decision itself (Häubl & Trifts, 2000). In other words, interactivity supported consumers in making better decisions more easily. One explanation behind this can potentially be found in the theory of embodied cognition. This school of thought suggests that cognitive processes are based on bodily interaction, meaning that cognitive mechanisms evolved by interacting with the environment (Huang et al., 2013). Thus, one could argue that the mind functions better when engaging in physical interaction. Researchers did find that interactivity decreased the information-processing workload and learning costs, and elicited more vivid mental images and memories (Brasel & Gips, 2014; Huang 2015). Schlosser (2003) uncovered that this facilitation of activating vivid images by interacting with digital content ultimately played a key role in influencing purchase intentions. Thanks to this characteristic of interactivity, he found interactive communication tools to evoke higher purchase intentions than passive means of information delivery, even though generally texts and graphs are more efficient in transferring information than interactivity (Schlosser, 2003).

In conclusion, interactivity can be argued to increase explorative behavior and facilitate information-processing during evaluation. Consequently, we assume that interactivity has a positive impact on the cognitive dimension of the consumer's experience, and therefore we put forward the following proposition:

P4: Interactivity has a positive impact on the cognitive dimension of the consumer experience in the search and evaluation phase.

6.3. Registration and its impact on search and evaluation

The third, and last characteristic of AR is registration, which is commonly understood as the alignment between the virtual and the real world (Azuma 1997). When an AR application exhibits registration it creates the illusion that both worlds coexist next to each other and allows the consumer to feel immersed in the experience (Azuma 1997). Hence, registration is closely intertwined with the concept of immersion. Olsson, et al. (2013) found that this feeling of immersion, or captivation as they call it, constitutes a characteristic that consumers expect from their mobile AR user experience in order for it to judge it positively. Another important user experience characteristic consumers expect is intuitiveness, or the feeling of naturalness when interacting with the virtual information (Olsson et al. 2013; Spreer & Kallweit, 2014). Should the AR application fail to demonstrate registration, i.e. fail to align the virtual and real world, the interaction will lose this feeling of naturalness. As a consequence, the experience will be disturbed and the consumer will be less likely to accept the AR application (Azuma, 1997; Spreer & Kallweit, 2014). Hence, one could argue that consumers expect registration to be present within their AR experience. Based on this line of thought, we expect registration to exhibit similar properties as Herzberg's motivational hygiene factors, which "*represent preventive, environmental conditions"* (Herzberg, 1974: 18). Correspondingly, we assume that consumers would not notice registration overly, if present, as it simply provides the context for the AR experience. If it were lacking, however, it would negatively impact the consumer's experience (Herzberg, 1974).

Unfortunately, technology is not yet advanced enough to constantly create perfect registration (Drascic & Milgram 1996; Azuma, 1997; Craig, 2013). Both static and dynamic registration mismatches still occur regularly (Azuma, 1997). Combined with other mismatches, e.g. in resolution and image clarity, luminance, contrast and shadow, as well as size, distance and depth, they disrupt the illusion of one combined world (Drascic & Milgram, 1996). Consequently, most current research and literature on registration focuses on improving registration by optimizing the technological systems behind AR (e.g. Souza et al., 2014), rather than exploring the impact registration has on the

user. For this reason, we will fall back on user experience research combined with various conjectures in the following two sections.

6.3.1. The emotional impact of registration

As mentioned above, good registration perfectly aligns the virtual and the real world, creating a feeling of presence and immersion within the user (Azuma, 1997). Baños et al. (2004) maintain that this feeling of immersion impacts the user experience mainly in non-emotional settings compared to emotional ones. Thus, one could assume that registration does not influence the emotional dimension of the search and evaluation phase of the CDJ. However, several authors, including Poushneh & Vasquez-Parraga (2017) and Rese et al. (2016), argue that user experiences not only draw on utilitarian value, but also gain from hedonic qualities, which underlines that an experience always includes an emotional component. As we consider registration to be similar to Herzberg's motivational hygiene factors, meaning it sets the context of the experience, we argue that registration will always influence this emotional component as well (Herzberg, 1974). However, we believe that only the lack of registration will leave a strong emotional impression on the consumer, presumably dissatisfaction (Herzberg, 1974). This is further supported by the findings of Olsson & Salo (2012), who found that most unsatisfying AR experiences are driven by inadequate technological quality, which faulty registration would constitute. Therefore, we propose:

P5: The lack of registration has a negative impact on the emotional dimension of the consumer experience in the search and evaluation phase.

6.3.2. The cognitive impact of registration

We assume the lack of registration to also influence the cognitive processes of a consumer's search and evaluation behavior. If registration is inadequate, the virtual information often does not appear to really belong into the real world as the misalignment of the digital content makes it appear less

real. Interestingly, some researchers found that lacking realism does not ultimately affect user involvement, engagement or satisfaction with the AR application (Baños et al., 2004; Van Vugt et al., 2007). Thus, one could argue that the lack of registration does not influence the explorative behavior, which is connected to user involvement and engagement. However, faulty registration will impact the feeling of immersion (Azuma, 1997), which we assume will negatively affect the consumer's willingness to spend an extended amount of time within the application, and thereby reducing his explorative behavior.

Moreover, the absence of registration will make it more difficult for the consumer to link the virtual information with the corresponding real surroundings, which impacts the value consumers can draw from the AR application. Without accurate registration, the virtual information will seem to be floating around the consumer's natural environment and not have a specific, spatial location (Bajura & Neumann, 1995). Hence, the informational value of placing this information in a specific situation will get lost and the consumer's understanding of the product will consequently lessen.

Lastly the impact of a registration error will vary considerably based on the intended application and task of the AR system (Azuma, 1997; Craig, 2013). In a medical setting, for example, just a few millimeters of registration error can be fatal, whereas users in a marketing setting are more likely to forgive several centimeters of error; especially as the human brain tends to correct small perceptual errors (Azuma, 1997; Craig, 2013). Nonetheless, we do believe that the lack of registration will negatively impact the user experience.

In conclusion, we assume that the absence of registration leads to diminished explorative behavior, as well as a narrowed understanding of the product. Therefore, we propose the following:

P6: The lack of registration has a negative impact on the cognitive dimension of the consumer experience in the search and evaluation phase.

Chapter 7: Methodology

7.1. Case applications

In order to understand how mobile AR impacts the search and evaluation behavior of consumers making a purchase decision, two studies of two different mobile AR applications were conducted, one for the case of *L'Oréal* and one for the case of *IKEA*. For each of these studies the case companies' branded AR apps were chosen.

7.1.1. Genius Makeup app

The *L'Oréal Group* launched its AR app, the *Genius Makeup app*, in June 2014 as one of the first AR applications in the cosmetics industry (Bloomberg, 2014). After working on the app for approx. 18 months, they introduced consumers to a highly tested and well-developed app which allows users to virtually apply makeup of the brand *L'Oréal Paris* on their faces (Bloomberg, 2014). Unlike other applications the *Genius Makeup* app does not require the user to take a picture of themselves to add the makeup to their face, but rather functions in real-time, allowing the user to interact with the digital makeup and observe it in different lighting situations.

Within the current Android version of the app (version 4.2.4) users can select makeup to try on from one of the following categories: eyes, including mascara, eye shadows, and eyeliner; lips, including lipsticks and lip glosses; and face which offers blushes. Additionally, consumers can scan a *L'Oréal Paris* product they find in a store and try it on virtually right there in the store. In the app section *'Latest Product' L'Oréal* highlights certain product selections, e.g. their new lipstick line. Moreover, users can select predefined makeup combinations within the section *'Latest Looks'* or special looks put together by fashion bloggers such as Simone Tajmer in *'Blogger Look'*. The application is intended for individual use and cannot simultaneously track more than one face. If the users like the result, it is possible to save the look, share it with friends and purchase the products directly from the app.

7.1.2. IKEA Catalog app

The chosen app for *IKEA* was the *IKEA Catalog app*, which offers consumers a digital version of the latest *IKEA* catalog as well as other digital publications such as videos or magazines, but also includes an AR feature. This feature was first added in 2012 after approx. six months of development and its first version allowed users to look inside of furniture and access additional content when scanning a page of the physical *IKEA* catalog (Forbes, 2012). A year later, in August 2013, *IKEA* updated their AR feature to what is today - a window into your living room, which permits users to virtually place *IKEA* furniture in their own surroundings (Wired, 2013).

Today's Android version of the app (version 17.02) opens to a home menu with six options: '*Publications'*, '*Settings'*, '*Store locator'*, '*Favourites'*, '*Help'* and '*Place your furniture in your room*', which is the app's AR feature. Within this feature, the consumer has two possibilities – (1) to use the feature together with the physical *IKEA* catalog, which will then act as a marker within the physical environment and will allow the application to place the selected products into the room in the correct size, and (2) to use the feature without the *IKEA* catalog as a marker, which will mean that products will not have the right size, but can be resized manually. Once, one of these two options is selected, the user receives a short introduction into how to use the feature, and can then proceed to choose a product from a variety of product categories. These categories include, for example, beds, wardrobes, chairs, tables, etc. Other than interacting with the chosen product, the user can also easily save the image into his picture gallery, re-center the product and access the product information and add it to his shopping cart and buy it online.

7.2. Research design

This explanatory research aims at exploring the relationship between the three AR media characteristics and the emotional and cognitive dimensions of the consumer experience. Therefore, the same multi-method approach consisting of qualitative research techniques was used for both cases. For each case, we carried out a study combining an experiment with an interview blending a

structured and semi-structured interview format. This was done to gain a better understanding of the impact of AR by mixing deeper insights gained from observations and the semi-structured part of the interview with the more quantifiable results of the structured part of the interview. Moreover, the study was cross sectional, studying the phenomenon at one particular point in time (Saunders et al., 2016).

A qualitative research approach was chosen as we wanted to acquire in-depth knowledge of consumers' thoughts and motivations and this type of research is considered most appropriate for studying subconscious reactions and identifying emotional and cognitive drivers of the consumer experience (Malhorta & Birks, 2012). The benefit of qualitative research in exploring the more subtle psychological processes of consumers, lies in that it can easily be adapted depending on the situation and on how respondents react (Malhorta & Birks, 2012). Therefore, it also allows you to look into more complex problems. Due to the novelty and complexity of AR, the test subjects might not be able to consciously describe their experience with AR fully. However, qualitative research allows us to also gain information on more subconscious processes, and thus provides us with a better and more valid result than quantitative research would (Malhorta & Birks, 2012). Consequently, a qualitative research design provides us with a more holistic outlook by considering the inner thoughts of the participant as well as the context in which the phenomena of interest occurs. Finally, it needs to be mentioned that our findings cannot be statistically generalized, due to its limited and unrepresentative nature (Saunders et al., 2016).

7.2.1. Experiment design

The first part of our study, consisted of an experiment in which we collected data through observation. This format of research allowed us to gather a rich dataset of primary observational data permitting insights into our test subjects minds (Saunders et al., 2016; Delbridge & Kirkpatrick, 1994). To that end, we first provided our participants with a smartphone with their respective AR app and asked them to use the application with the intention of buying furniture or cosmetics at the back of their

minds. Moreover, we requested that they describe what they were doing and experiencing during the experiment. We then observed our participants interacting with the AR application and explaining their behavior for a duration of approximately 5 to 10 minutes.

The observations were video-taped, to minimize information loss and simplify the experiment and situation, and thus let the researcher focus on the experiment (Aberbach & Rockman, 2002; Zuckerman, 1972). However, one of the problems that arises with recording observations and interviews is that it might provoke anxiety for the respondent, which may then result in pressure for the test subject (Kvale, 1996; Zuckerman, 1972). By assuring the participants that the data would be used confidentially in an anonymous fashion, and solely for this research project, the authors of this paper attempted to decrease candidates' apprehension, allowing the respondents to act more naturally and speak more openly (Zuckerman, 1972). This systematic observation of our candidates assisted in collecting the first pool of valuable information (Delbridge & Kirkpatrick, 1994). The benefit of collecting data in such a way, lies in the wide array of information the researcher gathers.

With regards to the observers' roles in the experiment, we decided to act as observer as participant (Saunders et al., 2016). We attempted to be on the sidelines of the experiment not interfering with the candidate's interaction with the app, though we would serve a guiding role if needed. This allowed us to focus on our role as researchers and provided us with a better feeling of the situation and a better learning experience (Delbridge & Kirkpatrick, 1994; Gill & Johnson, 2002). It also permitted us to write down insights as they occurred to us (Saunders et al., 2016). Furthermore, this behavior was meant to diminish the impact of the observer effect, meaning it aimed to prevent the test subjects from altering their behavior due to the fact that they were being observed and thus potentially making the data unreliable or invalid (Saunders et al., 2016). Therefore, we also attempted to place ourselves in an unobtrusive position in the room, allowing them space to interact with the augmented content without the observers being in the way. Finally, we sought to counteract the observer effect through habituation, i.e. choosing study participants who were familiar with us and would thus feel more comfortable in our presence (Saunders et al., 2016).

7.2.2. Interview design

Following the observation, the candidates were asked to take part in an interview. Seeing as interviews are an important tool, if a researcher needs to know what people think and how they interpreted an experience, we decided to use them as a research method to gain some additional insights into the experience of our test subjects (Aberbach & Rockman, 2002). For this we adopted a format which included elements of a semi-structured as well as structured interview format.

First, the participants were asked some open-ended questions regarding their overall experience in a semi-structured way, as this type of interview format allows the interviewee to give a fully articulated response and the interviewer to adapt the questions based on the flow of the conversation (Saunders et al., 2016). One disadvantage of the semi-structured interview is the inconsistent ordering of questions, which we however did not encounter due to the very limited amount of questions we posed during this part of the interview (Saunders et al.,2016). Similar to the first part of the experiment, this section of the interview was tape-recorded to prevent the loss of information. As before, participants were assured of the proper treatment of these recordings.

To guarantee the quality of the found data, we attempted to ensure that the interviews like the experiment were conducted without previous biases on the subject. Consequently, the interviewers went into the interviews with an open-minded approach, avoiding influencing the interviewee through tone or non-verbal behavior, in order to understand the underlying situation of the subject, rather than pushing them into a certain direction (Neuman, 2000; Holm, 2013). To avoid interviewee bias related to the test subjects' familiarity with the interviewers, we repeatedly asked them to focus on how they felt and what their honest opinion was (Saunders et al., 2016).

In the second part of the interview, we utilized a structured interview format consisting of an interviewer-administered questionnaire based on standardized questions, which were presented to a few students before conducting the research to ensure the clarity and comprehensiveness of the questions (Saunders et al., 2016). The questionnaire was divided into five sections: one addressing

the overall experience of the participant, one for each of the three AR media characteristics respectively, and finally one about the candidates' background, including their affinity for technology and familiarity with AR. The questions themselves were chosen to be closed questions, as they are easy to answer and increase the comparability of the results (McDaniel & Gates, 2001). However, the main disadvantage of this is that respondents lose flexibility in their answers (McDaniel & Gates, 2001). This was limited, by giving the interviewees the possibility to comment on their answers to the interviewer. The questions related to the three AR media characteristic sections were the same in order to ensure results could easily be compared. The questions were formulated in a way that made it possible to collect information about the impact that the AR features had on both the cognitive and emotional dimension of the consumer's experience. In these questions, participants were mainly asked to rate their experience on rating scales, more specifically for the questions pertaining to the cognitive dimension 5-point-Likert scales as well as 5-point bi-polar scales were used. In contrast the emotions were inquired after with the help of a 3-point value scale. The exact wording of the questions was inspired by the previous literature review. Through this structured interview, it was possible to collect standardized data to support the data collected through observations and open-questions.

7.3. Sample

As we aim to look at how mobile AR affects search and evaluation, only consumers who are likely to use a mobile application are worth being considered as part of the research population. Amongst consumers especially younger generations are known for their mobile use and openness for trying new technologies (Lissitsa & Kol 2016). Therefore, we limited our sampling frame to consumers of Generation Y, often also called millennials.

Segmenting markets according to Generational Cohort Theory has a long history in research and offers greater stability and insights than, for example, age segmentation (Lissitsa & Kol 2016; Steenkamp & Hofstede, 2002). Inglehart (1977) first suggested dividing consumers into segments

depending on their generation, which is defined based on the consumers' years of birth and generally spans 20 – 25 years, i.e. the amount of time it takes for one group to be born, grow up and have children of their own. The idea behind this method is that consumers of the same generation generally share similar values and beliefs due to them growing up in the same time span and under the influence of the same macro-level social, political and economic events as well as technological standards (Lissitsa & Kol, 2016; Parment, 2013). The values created under these influences have been found to remain stable throughout a consumer's life (Lissitsa & Kol, 2016; Parment, 2013).

7.3.1. Generation Y

Generation Y (Gen Y) is typically defined as those who were born from the early 1980s to late 1990s/ early 2000s (Kassaye & Hutto, 2016; Lissitsa & Kol, 2016; Parment, 2013). Individuals belonging to Gen Y have grown up during times of economic growth and an increasing internationalization and globalization (Lissitsa & Kol, 2016). However, researchers agree that the most influential factor of their childhood was the emergence of digital technology, the Internet and social media, which has resulted in them developing a technological savviness unlike any of earlier generations (Serazio, 2015; Parment, 2013).

Gen Y is the first generation which can be considered to be digital natives, i.e. people who have grown up with digital technology and cannot remember how the world was before the advent of the Internet. (Burdett et al., 2013; Lissitsa & Kol, 2016; Blackburn, 2011). Consequently, millennials rely heavily on digital devices for the majority of their everyday activities, e.g. for their hobbies, social networking or shopping, and spend more hours online than any other generation (Lissitsa & Kol, 2016; Kassaye & Hutto, 2016; Parment, 2013). Thus, researchers often describe millennials as being hyper-connected and digitally empowered (Serazio, 2015). Kassaye & Hutto (2016: 19) even suggest that this makes millennials "*the target audience for anything digital*". Gen Y's substantial use of digital devices, and more particularly mobile devices, makes them the perfect subjects for our research (Kumar & Lim, 2008).

Moreover, their constant interaction with the Internet, has resulted in millennials being superb multi-taskers, who are able to process information at incredible speed and efficiency (Parment, 2013; Serazio, 2015; Lissitsa & Kol 2016). This generation has become accustomed to dealing with information overload and have therefore developed very broad attention spans for diverse inputs, which means they are not as easily stressed as earlier generations when dealing with information flow (Blackburn, 2011; Parment, 2013). This characteristic, we believe, will make it easier for them to process the new type of information provided by AR applications and will prevent confusion due to the novelty of AR to taint our results.

In general, the likelihood of millennials already having made some first experiences with AR is rather high. Researchers agree that the majority of millennials are frequently innovators or early adopters when it comes to innovation adoption (Blackburn, 2011). Though they might not always lead the masses in all areas of innovation, research has proven that when it comes to the adoption of new technologies this generation can generally be seen at the forefront (Blackburn, 2011; Kumar & Lim, 2008). Combined with the great popularity of AR apps like *Pokémon Go* and *Snapchat* among millennials, this points towards the fact that Gen Y is likely to have used AR before. Therefore, using millennials as our sample will give us more precise insights into the effect of AR, by reducing the impact the novelty of the medium has on the consumer's CDJ.

At this point, it seems prudent to note that Gen Y's technology affinity has also left its mark on their purchasing behavior (Lissitsa & Kol, 2016). As with other parts of their life, millennials rely on their digital devices to help them make purchase decisions and thus typically research a topic online before deciding on which product to buy (Lissitsa & Kol, 2016; Parment, 2013). In doing so, they attempt to uncover several sources of information before making their decision, due to a deep-rooted skepticism of marketing messages (Blackburn, 2011). Further, Gen Y has been found to invest little effort and time into low-involvement decisions, yet high amounts of effort, time and emotions if the decision is of high-involvement, exploring large amounts of information online (Parment, 2013). However, their more intensive online search behavior notwithstanding, researchers have still found

that like consumers of other generations, millennials still appreciate being able to physically inspect a product (Blackburn, 2011). We take this as an indication that Gen Y's CDJ does not differ too substantially from other generations' CDJ, but rather is a prime example of how the CDP developed into the CDJ.

7.3.2. Participants

For identifying our sample, we used a traditional sampling approach rather than the Bayesian approach, in which we selected the participants before collecting the data (Malhorta & Birks, 2012). In line with the idea of qualitative research, we selected the participants with a non-probability, judgmental sampling method, which allowed us to choose a diverse group of people to take part in our research.

Table 4: Sample L'Oréal Case	
Size	10 participants
Gender	Female (90%), Male (10%)
Age	21 – 26 (average: 24,21)
Nationality	Danish (10%) German (40%) Italian (50%)
Occupation)	Student (70%) Employed (30%)

In our *L'Oréal* case, ten participants coming from three nationalities were picked to take part in the study, nine of them being female, and one male. The male test subject was chosen as he does regularly use makeup, including mascara and eyeliner. The participants varied in age and occupation, yet most were students, though from various disciplines. Of this sample, 50% of the candidates were currently in the process of purchasing cosmetics and 60% considered the brand of *L'Oréal Paris* as relevant to them. With regards to their involvement with makeup, however, the test subjects differed considerably. Some wore heavy makeup daily and put a lot of thought and effort into choosing the right look for them, while others only wore light makeup every day, while others again only put on makeup for special occasions, only purchasing cosmetics less than once a year. They also had differing levels of interest in technology, three test subjects being rather disinterested

in mobile applications. Of the sample 60% had experienced AR before, mainly through *Pokémon Go*, yet half of them only infrequently.

Table 5: Sample IKEACase	
Size	11 participants
Gender	Female (45%), Male (55%)
Age	17 – 27 (average: 22,27)
Nationality	Danish (27%) German (18%) Italian (45%) US (9%)
Occupation)	Student (64%) Employed (27%) High school student (9%)

Eleven participants, six males and five females, from four different nationalities were selected for the *IKEA* case study. The test subjects varied in their age as well as in their occupations, though the majority were students, albeit from several disciplines. The complete sample consisted of technology-savvy millennials with great interest in mobile applications. While eight of them had experienced AR before, mostly through *Pokémon Go* and *Snapchat*, half of the participants indicated that they had only used AR a few times (< 5 times) before. Overall, most of the test subjects found the brand of *IKEA* to be of relevance to them, yet their general involvement regarding furniture varied considerably. Moreover, some were very design-conscious with respect to furnishing their homes, whereas others were more practically oriented and extremely price-conscious. Two of the participants also revealed that they were at the time of the study considering purchasing new furniture.

Chapter 8: Results

After conducting and transcribing our research, we analyzed the results by using a thematic network approach (Attride-Stirling, 2001). Based on our perceptions of the studies we constructed a coding framework of 32 codes which were then assigned to the appropriate text segments from the transcripts. Next the underlying basic themes were determined and formulated in a careful manner. These basic themes were then clustered into five larger organizing themes, respectively *emotions, user experience, user behavior, content* and *purchase intention*. Finally, these organizing themes

were gathered into the four global themes, of *interactivity*, *augmentation*, *registration*, and *overall experience* (Attride-Stirling, 2001). This structure of codes was then used as a foundation for analyzing our results.

8.1. Case 1: L'Oréal

8.1.1. The impact of augmentation on the consumer experience

In general, participants enjoyed the experience of seeing the digital makeup projected on their own faces. Some candidates, however, raised some concerns that the application of the makeup did not fit their rather unusual face types. Subject (L6), for example, criticized that the app did not seem to know how to place makeup on an Asian face. In contrast, candidate (L7), who as a red-head had extremely pale skin found that the product selection within the app did not suit her complexion.

Participants that were not very much into makeup, actually supported the idea that the app was a good tool for them to get inspiration and overall were less critical. As candidate (L1), who mainly uses basic makeup on a everyday basis, mentioned: *"It's a very useful application. (...) I want to see if that product fits me and when you go to a shop you can't always try everything".* However candidate (L9), who is also not a makeup-enthusiast, claimed that though the tool could be inspirational, it didn't really provide any instruction on how to apply the makeup properly: *"But they don't tell me how to apply the makeup. So even if I buy these products for the look, I wouldn't know how to apply them and then it would look strange."* On the other hand, participants that were strongly into makeup, showed a very critical attitude and did not like the augmentation effects the app was suggesting. As candidate (L4) mentioned: *"Also look at the eyeliners, they already prepared a shape for you, but people use eyelinears in different ways, how can you imagine I will put it this way?*. As participant (L7) who uses makeup a lot suggested, the app could be a source of inspiration for those who are less fond of cosmetics. However for those who are passionate, it would be more difficult to trigger interest: *" I use makeup pretty much always, and always rather similarly, and I think if you are a bit set in your ways , then you don't get new experiences out of the app."* (L7)

Emotions. The emotions exhibited towards augmentation were highly pronounced, particularly when the participants first saw the augmented cosmetics on their faces. Immediately a sense of surprise and excitement emerged due to the unexpected outcome. This emotion was more intense at the beginning and would then decrease the longer the candidates used the app, though it would rarely disappear completely. Subject (L10) commented, *"I'm actually quite impressed with how well it worked"*. This feeling of surprise, was then quickly followed by signs of joy, such as laughing or smiling. Participant (L1) smiled and stated, *"Let's try the Eyeliner again. Wow, I like it.".*

Some candidates also felt amused by the augmented makeup, when the outcome of the augmentation didn't fit their expectations. Often it was considered too extreme, which evoked laughter combined with irony to follow. Candidate (L8) laughed, *"Pretty, pretty, pretty. [sounding ironic] I should always run around like this, don't you think so?"* Others' reaction to the high intensity with which the makeup was applied, was to feel more critical towards the augmentation. Particularly the question whether the real makeup would really look like the augmented makeup evoked high levels of skepticism. Participant (L9) even began feeling annoyed at the augmentation, criticising *"I couldn't really see the difference between the [chuckles] different look options. So it was always the same with the lipstick again. It always looked horrible."*

Hence, our observations revealed that mainly the positive emotions of surprise and joy emerged from the augmentation. However, participants also felt strongly critical. These findings were partly supported by the answers the candidates gave in the questionnaire, in which the majority of participants felt positively surprised, joyful and empowered, most of which strongly so. Surprisingly eight out of ten test subjects felt strongly playful when seeing the digital makeup projected on themselves. As indicated by our observation results, no candidates expressed that they felt sad or bored, yet a few participants were critical towards the augmentation. Only test subject (L4) felt slightly annoyed.

In conclusion, both observation and questionnaire results suggest that augmentation does elicit positive feelings, even though some negative emotions may occur. Thus, it can be argued that our findings of the *L'Oréal* case support P1.

Cognitive dimension. Our observations revealed that the augmentation did make some participants explore the app in more detail. The more products these subjects tried the more intrigued they became with examining the application. Candidate (L3) mentioned "*It's fun to play around with it and try on different products and explore the application.*" This explorative attitude would lead most candidates to search for more products in an effort to combine different cosmetics and create their own personalized look, which in turn gave them a better feeling of how the makeup would look together. Most participants would, for example, choose lipstick or blush according to the type of eye makeup they had chosen before, or vice-versa. Subject (L10) commented *"That does look quite dashing. .. but then the lipstick doesn't work anymore. But that doesn't matter. We can take this brown, and then choose a different lipstick which fits".*

However, many candidates did question the realism of the augmented makeup, and frequently criticized that the way the products were applied to their faces did not appear natural. Particularly the colours were judged harshly. Participant (L9) explained, "*... they just put a colour on top of a photo, but if the real colour touches my skin, it will look different. Or that is at least what I think.*". Nonetheless, opinions did differ slightly, on which products looked realistic, and which didn't. As for eyes and lips, there wasn't an homogenous evaluation. Some believed it was well done, while others disagreed. Candidate (L1), for instance found the lipsticks to look very unnatural, while she did like the mascara, declaring "*In reality I used to use this mascara, and the effect... it's pretty realistic.*" Test subject (L4) on the other hand, argued *"If I try the mascara. This looks like i put on fake eyelashes."* As for the blush, all participants criticized it and judged it as too fake and non-realistic. Participant (L8) laughed, *"For example, the blush, that looked completely horrible. Nobody would put their makeup on like that.*"

Overall, our observation showed that seven of the ten candidates didn't like their final look. Only one was quite satisfied with it. Though the idea of augmented makeup was appreciated by most candidates, they did not believe it would help them make a purchase decision, due to the fact that they did not perceive the level of realism as credible, nor did they like the way the makeup was applied to their faces. Most commented on the fact that the makeup was too extreme, comparing their augmented appearance with cartoons, carnival, or hookers. Particularly those participants with glasses found it difficult to imagine themselves applying makeup the way the app did. Though they did not encounter any technological issues, when they tried the app wearing their glasses, they did mention that they had to be more careful when putting on makeup in real life because of their glasses: "*If you are wearing glasses, you have to put on makeup differently than without. (...) If I would put on makeup as extreme as they did and wore my glasses over it, it would look horrible, even more than without, because it looks even more extreme."* (L9). Finally, candidates stressed the importance of physically going into a shop, in order to try the product on them and test the cosmetics on their skins. Subject (L4) explained, *"I'm skeptical, because it's difficult to imagine a product through this tool. It's fun cause you play with it, but I can't understand how someone would buy cosmetics just after using this."*

Consequently, our observations did reveal that though the augmentation did increase the number of products participants looked at, it did not seem to assist them in making a purchase decision or provide them with valuable information about the products, as the realism and extreme application of the makeup detracted from the usefulness of the augmentation. These findings are supported by the results of the questionnaire, which indicate that seeing the content projected on their faces, made the test subjects explore and try out more new product and looks. This behavior is explained, by the fact that eight candidates affirmed that they felt immersed due to the augmentation. However, no particular trend could be observed on whether augmentation influenced the duration with which the participants used the app. In line with our observations, the majority of the interviewees (7/10)

claimed that the augmentation feature was not assisting them in making a purchase decision and half of the participants stated that the information provided was not useful. Surprisingly, consumers disagreed considerably, whether the augmentation improved their understanding of the product. In fact three candidates stated in positively influenced their understanding, three indicated that it had a negative impact and four had a neutral opinion on the topic. Their answers regarding their brand awareness similarly inconclusive. Nonetheless, seven candidates agreed that augmentation had a positive impact on their experience.

In conclusion, we found that augmentation did generate explorative behaviour and created a strong feeling of immersion amongst the *L'Oréal* app users. Conversely, our results suggest that augmentation did not assist in collecting valuable information, and therefore was not useful for making a purchase decision. Hence, due to the inconsistent nature of our findings, it is not possible to support P2.

8.1.2. The impact of interactivity on the consumer experience

Overall, most participants liked the idea of being able to interact with the augmented products and enjoyed the degree of interactivity provided. Candidate (L6) confirmed, *"I think I have tried something like this … two years ago... [keeps pulling faces] ...which did not work at all. (...) It's fun to see (...) how it puts on stuff".* Several participants were impressed that the app allowed them to interact with the makeup at all, pointing out that most makeup apps work on still pictures. Hence, many considered the app to be innovative. Subject (L7) stated, "*It is definitely better than other makeup apps, especially because it is with the moving face. Usually it takes a picture and then makeup is applied to the picture*".

Emotions. While interacting with the app, the participants demonstrated various types of emotions, though to a much lesser degree than with regards to augmentation. For instance, some participants exhibited signs of joy during their experience. This positive attitude was exhibited throughout the

process and confirmed by several candidates commenting on how fun they thought the experience was. Subject (L6), for example, said, "*It was fun. Mainly playing aroun*d." Their enjoyment of the experience was also clearly visible in their facial expressions and behavior, as they smiled and laughed often when choosing the cosmetics and trying on makeup they wouldn't pick in reality. Moreover, the majority of candidates showed surprise at the fact that they could interact with the augmented content in real time, rather than simply applying makeup on a picture. Candidate (L9), for instance exclaimed "*Woah!"* when realizing that she could pull faces and the makeup would follow. Interestingly, not all candidates only enjoyed the interactivity of the app. Participant (L9) mentioned during her interview that she did not feel like she was in control when using the app, but rather as she put it, "I *felt like the app did what it wanted with me – definitely I didn't feel empowered.*" Overall, our observational findings suggest that the interaction between the candidates and the augmented makeup did not elicit too many strong emotions. Yet those that were generated were primarily positive, with barely any signs of negative feelings. The results of the questionnaire on the other hand show more intense emotions. All participants felt playful, particularly eight candidates rated their playfulness as strong, with just two subjects indicated it to be only slight. Further, almost all candidates also mentioned that they felt joy at the interactivity. The majority of the participants also stated that they were strongly positively surprised, which is in line with what the observations showed. The trends showed that by interacting, half of the candidates did not really feel empowered and only two candidates felt strongly empowered. Finally, no one felt sad, though surprisingly half of the participants did reveal that they experienced critical emotions at the interactivity.

Hence, one can conclude that the interaction with the digital makeup triggered primarily positive emotions. Only the questionnaire results showed slight critical feelings within the participants. Therefore, our findings in the *L'Oréal* case support P3.

Cognitive dimension. We found that interacting with the digital products had a positive effect on the explorative behavior of the participants which resulted in them inspecting different types of makeup. Interestingly, test subjects did not however follow a logical path in trying different makeups,

but jumped from product to product, or between the products and looks options based on their individual preferences. Nonetheless, the more products they would interact with, the more they felt like exploring other products. As participant (L3) stated, *"It's fun to try on different products and explore the application."* One of the app features the participants interacted with the most was the intensity regulation, which highly impacted the realism of their experience. This tool allowed users to adjust the cosmetics' level of intensity. Those candidates that found this option were happy to use it frequently thereafter and felt it benefited their experience. Subject (L2) commented, *"So here i can change intensity and color. Cool!"* The participants who did not find it, however, experienced the application as much less useful.

The interactiveness of the app also elicited a high degree of physical movement. Candidates liked to pull faces, and interact with the makeup by putting the phone closer or further from where they were. By changing their facial expression, e.g. widening their mouth and eyes, or turning their heads slightly, they attempted to better perceive the products and see how the makeup would look on their faces. Yet, not all participants were that expressive with their facial movements. In fact, some were quite moderate in their interactions.

All in all, our observations suggest that both explorative behavior and the understanding of the product were positively impacted by the interactivity. This was only partially verified in the findings of our structured interview. According to the results, interacting with the digital content affected the majority of the candidate's experience positively. However, with regards to explorative behavior opinions were mixed. Though half of the participants agreed that the interaction feature made them want to try more products and use the app for a longer period of time, the other half disagreed. Yet seven out of ten, did agree they felt slightly immersed when discovering the application. Nevertheless, when asked whether the interaction feature assisted them in making a purchase decision, the majority of the participants agreed that it actually did not. Moreover, even though half indicated that the information provided was useful, our results did identify a clear trend with regards

to whether it gave them a better understanding of the product or whether it impacted their future intention to buy a *L'Oréal* product again.

In conclusion, our combined findings suggest that interactivity did increase explorative behavior of the AR user slightly. However, our findings whether it helped the understanding of the product and thus the purchase decision were inconclusive. Hence, we argue that our findings indicate a slight positive impact on the cognitive dimension of the consumer. Therefore, P4 is slightly supported.

8.1.3. The impact of registration on the consumer experience

In general, the registration of the *L'Oréal* app was perceived to be rather good. Only occasionally did registration errors occur, mainly due to too fast movement or objects covering the face. Candidates attempted to test the registration level of the app by pulling faces and widening their eyes and mouths. Interestingly, all ten participants showed this behavior, whether consciously or subconsciously. Some were very extreme in their facial expressions as they attempted to test the app's registration to its limit. On the other hand, others were more discrete, for example, by pulling the phone closer to their face and slightly turning their head.

Emotions. Only few participants demonstrated emotions explicitly linked to registration. Subject (L6), who is generally very interested in technology, expressed joy combined with a sense of surprise due to the unexpected quality of the registration. She moved her head around repeatedly to observe how precise the makeup was applied and whether it would stick. This was also observed in other candidates who felt impressed and surprised by the level of precision and recognition the application had regarding eyes and mouth. Participant (L9) additionally exhibited signs of satisfaction, when first noticing the registration, commenting *"Ahh! It even works when I open my mouth! That is good".*

However, the questionnaire results did indicate the presence of more emotions. Half of the candidates indicated strongly playful and joyful feelings related with the level of registration, while seven participants were positively surprised. Moreover, test subjects divulged that they felt slightly

empowered. Conversely, three candidates were annoyed, two of which were both strongly annoyed and slightly bored. One of these, in turn, also signaled that she felt slightly sad. Furthermore, it emerged that half of the participants exhibited critical feelings with regards to registration.

Overall, our observation revealed a few individuals expressing a feeling of surprise and being impressed with the quality of registration, whereas the questionnaire did show that most participants generally felt playful, positively surprised and joyful. Based on these results, we assume good registration to have a slightly positive impact on emotions. Barely any emotions were exhibited in relation to the few registration errors present in the app. However, our findings do not allow us to make any assumptions regarding P5, as they relate mainly to the fact that good registration is present, whereas our proposition is based on the assumption that registration is faulty.

Cognitive dimension. The registration feature was also barely mentioned by the candidates within the observational part of the study. Though, several participants were impressed with the registration, some slight registration errors did occur. The app wouldn't always perfectly scan the candidate's face, which resulted in lipstick being applied to the participant's teeth or in eye shadows and mascara being painted on the candidate's hair. Subject (6) states, *"It is not too precise: It colors my teeth too, but not that much."*

The questionnaire results revealed more of what people thought of registration. Overall, the registration positively impacted half of the candidate's experience, while the other half indicated it didn't really have an effect on them**.** Further half of the participants agreed that registration's quality actually made them want to try out more products across the application, yet there was no clear distribution on whether this characteristic made them want to try out the app for a longer period of time or not. Nonetheless, 50% of test subjects did indicate that they felt immersed. However, registration did apparently not assist the majority of candidates with their purchase decision, nor did it give them valuable information. Interestingly, interviewees could not agree whether it helped their understanding of the product. Surprisingly, four of the ten candidates expressed that the registration

had a negative impact on their brand consideration. Consequently, our study reveals only a slight impact of registration errors on the explorative behavior, but otherwise no effect on the cognitive dimension. Hence, P6 is not supported.

8.1.4. The overall consumer experience

When looking at the overall experience, on a scale from 1 to 5, seven candidates showed to appreciate the experience by grading it with a 4. Throughout the whole experience the application contributed to generate mainly positive emotions, such as a sense of playfulness and fun, which were, however, typically more intense towards the beginning of the journey. The participants would show a curious and explorative behavior, jumping from one product to the other, and trying different looks and combinations. They explored the different cosmetics colors and intensities, and occasionally attempted to test the quality of the registration by making facial expressions and moving the smartphone around. Eight candidates did agree that the app effectively succeeded in making them feel immersed.

However, even though the experience was entertaining, the more familiar they got with the application the more critical most test subjects became. First of all, they expected a wider range of products to try, as some fundamental basic makeup types, such as concealers or foundation, were missing. Further complaints arose as the level of realism of the augmented content in relation to the makeup's shapes and colors. The way the digital makeup was applied did frequently not resemble how participants would wear it in reality. For example, the eyeliner shapes were very extreme and only put on in one distinct way. Also, some participants disapproved that the app would not explain to them how to apply the makeup to arrive at the look it showed them. So even if they bought the products, the candidates doubted they would ever manage to appear the same way as in the app. Finally, the navigation through the app was criticized as not being intuitive enough.

Therefore, even though most appreciated the idea behind the app and did enjoy the experience, they did not believe that it would be helpful in their search and evaluation of products. Even though

half of the candidates believed the app gave them additional information about *L'Oréal* products, they still stated that the app was an unhelpful tool for supporting their decision-making. Most stressed how important the store experience still was to them for trying on and testing products. In fact, only three candidates thought they would use the app again in the future.

8.2. Case 2: IKEA

8.2.1. The impact of augmentation on the consumer experience

In general, we observed that candidates experienced the augmented products differently depending on the real furnishings of their location. In rooms, which had a lot of space, participants would select products as if they were re-furnishing the room. In rooms, which were fully furnished and had little open space, however, the purpose of the augmentation instantly became less real to the interviewees, eliciting more playful behavior.

Emotions. The emotions which were exhibited towards the AR characteristic of augmentation were not particularly pronounced. Only one emotion was observed in the majority of participants, though a few other emotions were seen in individual test subjects. Eight of the eleven participants showed signs of joy at seeing digital furniture placed in their rooms, such as smiling or chuckling at whichever product they had just chosen. Subject (I6) expressed his joy by remarking "*I do believe a Pikachu just appeared*". Participant (I11), however, declined when asked whether he experienced joy at the augmentation, commenting "*That would assume that placing objects in my room makes me feel happy - no not really*". For some participants, their feelings of joy were mixed with signs of playfulness, which seemed to originate from seeing the digital products placed in places, in which furniture would normally not be found. Subject (I2), for example, laughed out loud when the first product she chose, a wardrobe, appeared on the table she was facing. Participant (I8), who had a similar experience, instantly repurposed the chair he chose as "*A good place to have a cat*".

Another feeling a few participants exhibited was surprise when the digital furniture appeared in the room. This emotion was most strongly displayed the first time they chose a product, yet some did

show slight signs of the emotion, e.g. a widening of the eyes or a quiet "*Oh*"l. Participant (I4) also seemed to be surprised when regarding how well the digital shelf she chose fit into her room. A few other candidates seemed satisfied when they managed to place the digital product the way they wanted in relation to real furniture in the room. Conversely, the augmentation also elicited a feeling of criticism in four participants. This feeling emerged mainly in relation to the perceived realness of the digital furniture. Subject (I10), for example, openly complained about the products not looking realistic, but animated.

Hence, the findings of our observation reveal that augmentation mainly elicited a feeling of joy, and only some individuals felt other positive, and occasionally one negative emotion. In contrast, the participants indicated several strong positive emotions in relation to augmentation in our structured interview. Most dominantly, all but two subjects denoted that they felt strongly playful. Just over half the participants (6/11) also indicated that they were strongly surprised and joyful at the augmentation with only a few maintaining that they did not experience the emotions. Interestingly, most candidates also revealed that the augmentation had made them feel empowered, though most just slightly so. As observed, just under half the participants did feel slightly critical, however some very few also said to have felt slightly sad, annoyed and bored at the augmentation.

Consequently, both observation and questionnaire results suggest that augmentation does elicit positive feelings, and only in some cases slightly negative emotions. Thus, it can be argued that the results of the *IKEA* case support P1.

Cognitive dimension. Our observation revealed that most participants liked the idea of being able to see the digital furniture in their own private rooms. They particularly stressed the benefits of the app bringing the products into their homes. Some participants found it comfortable that they did not have to leave their house in order to find nice furniture, while others saw the value of the augmentation in terms of assisting visualization. When asked what he liked about his experience with the *IKEA* app, participant (I3) answered "*The thing I liked the most is that you are at home (…).*

So you put yourself where to put the furniture and you can do it from home directly". Most other test subjects agreed with him. They found it useful to have the digital products projected right to the spot the real products would then occupy. Participant (I2) states, *"It's awesome because you can picture the furniture in reality and not just in your mind, it's actually useful.".* Others also added that it would be helpful in determining the right style and colors of furniture. Participant (I7) found the app so useful that he even asked whether it was freely available. We observed that these comments aligned well with the participants' behavior within the app. Several participants attempted to place the digital product they chose next to real furniture in the room, e.g. a chair at a desk or a TV cabinet underneath the TV.

Furthermore, seeing the digital products in the context of their real surroundings, made some participants explore the product range within the app in greater detail, choosing several products out of pure curiosity of seeing them in relation to something in the room. Comments like "*How would that look here?"* or "*This product could go here*" were frequently observed. When participant (I11) was disappointed at how one product looked, he muttered "*now I want to choose a different one*" trying to find a better fit. Such explorative behavior was not limited to finding more products, but also included attempting to understand the chosen product better. Several participants moved physically in an attempt to see the product and the room from different perspectives. Participant (I10) even circled her chosen product once, to really see it from all angles of the room.

However, the participants were also critical about the usefulness of the augmentation. As mentioned in section 8.2.1 most participants mentioned the fact that the dimensions of the products were not realistic as you could resize them, which eliminated any information to whether the product would fit size-wise into the room. Participant (I4) puts it like this, "*My doubt here is that if I don't have real dimension, I can put every object here, but they wouldn't match with reality*". Yet, other aspects of the augmentation were criticized too. Some participants found it irritating that the products looked very animated and digital. Participant (I6) declared "*I am not sure if that is actual products, because they look very graphically. I mean they don't look well enough for me to believe that they are chairs.*

They look .. [laughs] like Pokémon - but as chairs". Conversely, participant (I8) found only some products to look animated, and others to look quite realistic. Participant (I5) on the other hand, found the realness of the digital products to depend on how close to herself she placed them. The farther away she placed them, the more realistic they appeared to her.

Besides the quality of the augmentation, some participants questioned whether the augmentation in itself really provided added value. Two participants suggested that the augmentation in its current quality might not be too different from looking at products in a physical magazine and imagining the product to be in the room. Participant (L9) explained: "*I think you would have to project it as a hologram into the room. As long as it stays in the smartphone, it is not that different from using a picture. You still look up and down, and don't really know how it would look like. You still need your imagination*". Participant (I11) went a step further admonishing that human imagination should be enough, and thus doubting any necessity for augmentation. Participant (I6), on the other hand, commented on the fact that he tended to over-focus on the digital product, which reduced the informational value he got from it being placed in relation to other furniture.

Thus, with our observation we have found that augmentation did increase explorative behavior with most participants. However, opinions were mixed about the usefulness of it, though most did concede that the concept, if improved technologically, would probably be valuable. These findings are mirrored in the results from the questionnaire. Participants' answers to whether they found the information they gained from the augmentation valuable varied, though they leaned more towards the positive side, with only one person each finding them useless or slightly useless. This trend continued in their answers to whether the augmentation would assist their purchase decision, whether it influenced their understanding of the product and whether it influenced their brand choice. Consequently, it appears that participants do not agree on the extent augmentation influenced them, or if at all, though they do concur that it did not negatively impact them. With regards to explorative behavior, the questionnaire results only partially confirmed our findings from the observation. Most participants indicated that they did explore slightly more products due to the augmentation and they

did feel slightly immersed. Yet, their opinions on whether it made them try the application for longer are very mixed, with no clear trend. Nonetheless, all participants agreed that the augmentation did positively influence their overall experience.

In conclusion, our findings reveal that augmentation does elicit explorative behavior and does have at least a slight influence on the understanding of the product, which would assist in making a purchase decision, if the dimensions were fixed. Consequently, we assume that the overall impact of augmentation on the cognitive dimension is at least slightly positive. Hence P2 is slightly supported.

8.2.2. The impact of interactivity on the consumer experience

In general, most participants declared that they liked the idea of interacting with the digital products through the app. Several of them commented on how they perceived the concept of interaction to be innovative. Subject (I7) states "*It was a creative idea to use that kind of interaction between the company and its products and the experience you need to have as a user*", while candidate (I11) even goes so far as to say, "*If I couldn't interact with it, it would be stupid*". Particularly, that they could move the products around and rotate them was mentioned repeatedly. Yet, some test subjects did encounter technical problems when attempting to move the digital furniture, though only participant (I9) appeared to get overly frustrated at this technical issue. Nonetheless, she pointed out that some difficulties in dragging around the furniture would not negatively influence her decision-making process.

Emotions. Throughout the observation and the following interview, participants exhibited a wide range of emotions concerning their interaction with the digital furniture. Most dominantly, participants showed strong signs of playfulness. Several subjects played around with resizing and placing the digital furniture in untraditional places like, for example, on a stack of paper or on the ceiling. Participant (I8), for instance commented: "*I can make it look like there is a giant coat hanger outside".* Others, like interviewees (I4) and (I11), also started interacting with persons in their line of view,

putting furniture on the interviewers or in relation to persons they could observe from their rooms. Three participants described the experience as being game-like, two of them comparing it to Sims. Depending on the participant, these signs of playfulness emerged from the very beginning of their experience with the app, or only after they had explored the app for quite a while. Once the participants became playful, however, they continued exhibiting playful behavior for the rest of the observation.

Another emotion, which was strongly displayed by most participants throughout the experience was joy at being able to interact with the digital products. Interacting with the furniture caused eight out of eleven participants to smile frequently, describing the experience of resizing and dragging products as "*fun*" or "*cool*". Participant (I1) states: "*It's funny. It's like a game. Usually buying furniture might be boring, but this app makes it fun"* Finally, a lot of candidates expressed surprise at some point during their experience. Most frequently, this was after they discovered a new way of interacting with the digital products, such as the re-center function, the rotation function or the fact that due to registration the product would (mostly) stay in one place. Subject (I9), for example exclaimed *"Oh! I can resize it!"* after resizing a product for the first time. After discovering an interaction function, no participant showed repeated surprise at being able to interact with the digital content. Their surprise only emerged on this one singular occasion.

Other emotions arose less widespread and on a more individual basis. Three of the eleven participants seemed to feel satisfied at being able to figure out how to interact with the digital furniture, nodding and smiling when they understood the interaction function. Interviewee (I1) expressed curiosity at how much he could interact with the digital product, asking whether he could also move around the room. Only participant (I9) demonstrated negative emotions towards being able to interact with the content. At first, she was confused at how she could interact with the products, then annoyed when the interaction did not properly work, which as she mentioned in her interview tainted her experience with the app considerably. At one point, she also communicated

disappointment at not being able to fully interact with the products, for example not being able to open wardrobe doors.

Overall, the observation showed that interacting with the digital content elicited mainly positive emotions, namely playfulness, joy and surprise. Only in one special case did a participant clearly show negative emotions towards the interaction aspect of the AR. These findings are mostly supported by the answers the participants gave in the questionnaire following their experience with the *IKEA* app. As found in the observation, the results of the questionnaire confirm that most participants felt strongly playful, as well as joyful and surprised during their interaction with the digital furniture. Yet the answers do indicate that both joy and surprise were felt to a lesser degree by the participants. With regard to feeling empowered by the interaction, four people indicated that they did slight feel empowered, two even felt the emotion strongly. In contrast to the findings of the observation however, some participants did admit to feeling slightly negative emotions namely annoyance and boredom. Though no participant felt sadness when interacting, more than half did admit to being critical of the interaction, two of them even strongly so.

Consequently, one can conclude that the interaction with the digital furniture did trigger mainly positive emotions, which were felt rather strongly. Yet it seemed to also have induced some negative emotions albeit to a much lesser degree. Hence, one can argue that the positive emotions evoked by the interaction dominate the experience, which would mean that P3 is supported by our findings from this case.

Cognitive dimension. Interacting with the digital products did not seem to impact participants' explorative behavior in terms of choosing a higher number of products. On the contrary, participants spent more time with the products they chose, moving them into different places, rotating and resizing them, and essentially exploring how they could interact with them. Nonetheless, participant (I8) commented: "*I actually see it as a better way, or more fun way to get to know more products*". This explorative behavior with regards to getting to know the chosen products as much as possible

could also be observed in the high degree of physical movement the interactivity of the app elicited. Nearly all candidates moved the phone as well as their bodies, leaning back and forth in their chairs while interacting with the digital products. Subject (I10) even stood up to better place products in her living room.

However, the fact that participants could resize the digital furniture did cause some friction. Though most participants did enjoy using the resizing option, most did criticize that it reduced the usefulness of the app. Participant (I3) mentioned it several times and took the time to explain: "*The main problem is that it's hard to calculate the real dimensions. (…) it's difficult to understand the real dimensions of the chair once you put it in the space. (…) The application should create the dimension based on reality not as we wanted to be"*.

Nevertheless, the questionnaire results indicate that consumers did feel like the interaction with the digital products did improve their understanding of them, with only four indicating that it did not impact them at all. The results about the usefulness of the product information, however are more mixed. Several participants found the information to be slightly valuable, but a few also revealed that they felt it to be useless. Consequently, the opinions about whether the interaction would help their purchase decision were just as mixed. Surprisingly, even though no explorative behavior in terms of number of products chosen could be observed, the majority of test subjects thought the interaction made them consider more products than usual, with only participant (I11) concluding that it did not influence his amount of choices. Their answers regarding the impact of interactivity on the duration they used the app, however, are more in line with what we found in the observation. Just over half of the participants remarked that they did use the app slightly longer, because of the interactive aspect. This fits with their answer that the majority of them felt slightly immersed due to the interaction. Overall, the participants maintained that interactivity did positively influence their overall experience. Over half even indicated that it did slightly influence their decision to buy *IKEA* the next time they were purchasing furniture.

To sum up, our findings of the *IKEA* case suggest that interactivity does positively impact explorative behavior both in terms of products considered and duration spent with the brand. Moreover, interactivity does seem to have a positive effect on the understanding of the product, and provides consumers with a positive brand experience. Hence, these results support P4.

8.2.3. The impact of registration on the consumer experience

In general, the *IKEA* app's registration did not work as well as the registration of the *L'Oréal* app. Products did usually stay in the place the user placed them at, if the user made a panning motion with the camera, i.e. moved the camera sideways in a sweeping motion as if scanning the room. However, if the phone was moved up or down, or straightly towards or away from the product, the product would follow the movement of the camera. Moreover, this error in registration was super-sensitive to movement, so that a slight shake in the hand of the user made the furniture bounce up and down, which gave the impression that the furniture is floating rather than standing on the floor. This combined with some infrequent larger registration errors, in which the digital furniture moved a bit of its own accord, made the app slightly difficult to use at times. Participant (I4) commented, "*The shelf doesn't always stay perfectly in the place I put it. It's a bit hard to handle!*". Furthermore, the faulty registration did elicit a lot of physical movement in the candidates as they were trying to understand how the registration worked. These, experiences led most participants to mention that the technological quality of the app could be better, though they did acknowledge that it was still impressive how well it worked.

Emotions. Participants generally did not discernibly link their feelings to the app's registration, which made it difficult to distinguish clear patterns based on our observations. Only some isolated candidates expressed some emotions. The one that most of these participants demonstrated was surprise**,** when they first experienced the registration, meaning when they moved the phone sideways and realized that the product stayed in its place. After turning her body with the phone,

interviewee (I9) exclaimed *"Where did my chair go?"* and once she turned back to her original position *"Ohhh!!! It stays in the same place!",* sounding astonished.

The other emotions participants conveyed pertained to the fact that the candidates encountered registration errors. Some few found the faulty registration to be intriguing, curiously exploring when the registration would work and when it would not, while a few others seemed to be amused by it. Participant (I8) laughed, *"someone is trying to crawl under it",* at seeing the cabinet he chose, slightly jump up and down. However, the same participant got annoyed at the lacking registration after a while, stating *"And also the bouncing around… is … impossible to avoid I guess, but … a bit annoying".* Interviewee (I11) even stated disappointment at the flawed registration, *"The object is relative to the camera, not the room. (…) – which is sad"*.

Hence, our observations did not reveal many emotional reactions to the registration and only in a few individual participants. Conversely, the questionnaire results do divulge that the interviewees did experience a range of emotions, though mostly only to a slight degree. Eight out of the eleven candidates, for example, indicated that they felt slightly empowered by the registration, while just over half felt joyful and playful. Interestingly, the remaining five participants declared that they did feel strongly playful. Also, the majority of test subjects affirmed that they felt surprise, though to varying degrees. With regards to more negative emotions, most participants stated that they did not feel sadness, annoyance or boredom with regards to the registration, merely two to three indicated that they felt these emotions slightly. The only exception was participant (I3), who was strongly annoyed and bored. In his interview, this candidate stressed the fact that the digital products needed to feel real in order for the app to provide any value. Thus, we assume this focus on realism made him experience strong negative emotions when he encountered the faulty registration, which detracted from the illusion. The one more negative emotion almost all participants expressed in their questionnaire answers was a feeling of criticism towards the registration, though they disagreed on the degree of the emotion.

Overall, our observation did not really reveal any consistent emotional reactions to registration, whereas the questionnaire did show that participants generally felt playful, positively surprised and critical, as well as slightly empowered and joyful. Therefore, it appears that our findings in the *IKEA* study do not support P5.

Cognitive dimension. A theme that emerged across all our observations, was that each participant commented at some point during their experience on the fact that the digital furniture would not stay still, i.e. that it kept bouncing slightly. Some even asked whether it was possible to stop it from happening. Several test subjects asserted that it destroyed the feeling of immersion for them, and distracted them. Candidate (I6) states, "*I really disliked that you couldn't (…) ask the furniture to stay somewhere. (…). But that made it (…) apparent all the time that I was in augmented reality. I never had the illusion of … there actually was furniture there".* Others agree with him, maintaining that the faulty registration made the digital furniture feel less real, which detracted from the usefulness of the application in terms of assisting a purchase decision. Interviewee (I9) mentioned how the lacking registration irritated her understanding of the product, saying "*Cause it is throwing me off a bit. It's staying there, but is also kind of not*". At the same time, however she did admonish that she did choose more products because she wanted to explore the extent of the registration.

Surprisingly the majority of participants, did confirm this tendency as well within their questionnaire answers. However, the results with regard to whether they tried products for a longer period of time, are inconclusive. About half indicated it did, whereas the other half disagreed. In general, the test subjects were of split opinion about the topic of registration, with answers diverging considerably and only a slight trend towards the more positive side being distinguishable. Barely over half felt that it did make them feel immersed in the experience, whereas only slight less than half disagreed. Similarly, a few more interviewees found the information they received from the registration to be valuable than those who said they were useless, which is also visible in how registration influenced their understanding of the product. Conversely, a clear majority communicated that they did not find the registration helpful in assisting with a purchase decision. However, this did not impact their brand

interest, as eight of eleven participants conveyed that the registration did not affect the likelihood of them purchasing *IKEA* in the future. With regards to the influence of the registration on their overall experience, candidates' opinions were once more split. three subjects found it to influence the experience slightly positively, four subjects found it to influence it slightly negatively, and four did not think it influenced them at all.

Consequently, our observation results do confirm that lacking registration has a negative impact on the cognitive dimension, whereas the quantitative results do show a slightly positive influence in terms of explorative behaviour and immersion. However, the lack of registration did negatively impact the candidates' purchase decision. Most other outcomes were inconclusive due to the varying distribution of answers. Therefore, one could argue that the overall impact of the faulty registration is negative rather than positive, which supports P6.

8.2.4. The overall consumer experience

In general, participants quickly figured out how to use the application, and were typically rather satisfied with the navigation of the app. However, several test subjects questioned the number of products in the application, wondering how the products were selected. Yet, this did not influence their overall experience. The slight majority (6/11) gave their experience a grade 3, while the remaining five rated the experience with a 4 (on a scale from 1 to 5).

All in all, the various functions of the app, such as the re-center option, the link to the online shop or the screenshot function, elicited strong signs of excitement and surprise as well as curiosity, which led to explorative behavior, in most participants. At the same time, some candidates seemed to feel quite satisfied when they managed to make the app do what they wanted to do. Other feelings that were strongly exhibited throughout the experience were playfulness as well as joy. Participants laughed and smiled a lot and showed clear signs of having fun. These observations are supported by the answers the candidates gave in the questionnaire, where seven out of eleven stated they felt positively during their experience. More negative emotions, such as annoyance, frustration and

criticism were generally linked to faults in the technological quality of the app and ensuing problems in operating the app. Furthermore, all interviewees did express disappointment at not being able to place more than one digital product on the screen. They criticized that this limited the usefulness of the app considerably, as if you re-furnish a room you will typically need more than just one item of furniture.

Nevertheless, most participants really liked the idea of the app, calling it a creative and innovative way to engage consumers, and mentioned that they could see the potential of it in helping consumers make purchase decisions. Hence, in the questionnaire results the majority of subjects felt that the app gave them useful information about the products. However, several interviewees did point out that the technological realization of the concept still needed some work for it to be truly useful. This is mirrored in the answers the interviewees gave in the questionnaire, the majority stating that the app would not help them with a purchase decision.

Yet, most candidates did still exhibit signs of explorative behavior when using the application, such as spending long time with a product or choosing several different products. Interestingly, for some participants this explorative behavior was not limited to the actual AR function of the application, but also included scrolling through the available products attentively and reading about them on the linked *IKEA* online shop. Furthermore, the experience inspired a few consumers to consider whether certain products might be a nice investment for the rooms they tried the app in. This might be due to the fact that no matter how candidates explored the app, they always spent time on considering the products within the app, evaluating them and regarding them in the context of their surroundings.

Chapter 9: Discussion

This study attempted to give first insights into how mobile AR applications influence consumer's search and evaluation behavior within the consumer decision-making process. In our research, we examined the effect the three AR characteristics, augmentation, interactivity, and registration, have on both the emotional and the cognitive dimension of consumer search and evaluation phase of the CDP.

9.1. Augmented Reality and the emotional dimension

Within this paper, we identified a significantly positive impact of mobile AR on the emotional dimension of the consumer experience during the CDJ. Both interaction and augmentation elicited clearly positive emotions within the consumer, whereas registration only evoked a slight, yet also rather positive emotional reaction when good, and a slight negative reaction when flawed. As several researchers maintain that positive emotions during the CDJ will increase consumer involvement, deepen a feeling of immersion, trigger explorative behavior as well as motivate decisions (Olsson & Salo, 2012; Hoffman & Novak, 2009; Gao et al., 2009; Hyun & O'Keefe, 2012; Krohmer, 2012), we argue that on the emotional side mobile AR positively influences the consumer's purchase intention. Due to the fact that buying cosmetics relies particularly on emotional involvement, we claim that this effect will be especially pronounced in the cosmetics industry. However, we do have to note that, though the literature argues that positive feelings during the consumer experience will be associated with the brand (Parise et al., 2016), most study participant did not consciously perceive the AR experience to have altered their brand perception positively. Nevertheless, when asked to describe the experience many used words such as *'innovative'*, *'creative', 'cool',* or even *'glamourous'.* Hence, we suggest that the effect of the positive emotions on the brand perception might be subconscious and take a while to manifest.

In both case studies, we found that the emotions of joy, playfulness and surprise dominated the participants' experience with regards to interactivity and augmentation. Consumers laughed and smiled and generally enjoyed their experience with the app and the brand. Other researchers examining AR experiences confirm these findings with their study results. Yaoyuneyong (2016) discovered high levels of playfulness originating from AR, while Olsson & Salo (2012) assert that awareness of the augmented content elicited strong satisfaction in AR users, and Javornik (2016) states she found augmentation to evoke a feeling of surprise and intrigue. The only negative emotions we observed with regards to these two characteristics were related to issues with the technological quality of the apps, which coincides with Olsson & Salo's (2012) argument that most commonly unsatisfying AR experienced were linked to technological failures. Interestingly, however, we found that the degree of emotion exhibited varied between the two characteristics, depending on which application the participant was using. While interviewees using the *IKEA* app had a strong emotional reaction to the interaction function of the AR, yet a less powerful reaction to the augmentation, the *L'Oréal* candidates were more taken with the augmentation, showing less signs of emotion at the interaction. We argue that this phenomenon is due to the type of product the two brands sell.

For makeup, the interaction with the product is of less importance, as the information consumers want to get is mainly related to how it looks in relation to their skin. Therefore, participants would presumably not pay as much attention to the interactive feature of the *L'Oréal* app, but rather focus on the augmentation. We see this assumption confirmed in the amount of physical behavior *L'Oréal* test subjects demonstrated, which was considerably less than exhibited by the *IKEA* participants. Their movement was mainly related to better seeing the makeup on their faces, or to the registration. The augmentation of the makeup on their faces, on the other hand, possibly evoked stronger emotional feelings, as most consumers consider their face to be closely linked to their identity and any augmentation of it will thus impact their self-understanding, and consequently cause a strong emotional reaction (Belk 1988; Javornik 2016). We believe, that this is also the reason why *L'Oréal*

candidates indicated that they felt strongly critical about the quality of augmentation, whereas *IKEA* subjects did not. The *L'Oréal* participants saw the augmentation as a more direct reflection of themselves, and thus found the lacking realism of the makeup to be a direct affront to their identity.

The consumer's room, on the other hand, which is still part of a consumer's identity according to Belk's theory of the '*extended self*', is less closely related to the consumer's self, and thus will elicit a less strong reaction when altered with augmented furniture (Kunst & Vatrapu, 2014; Belk, 1988). This, combined with the fact that the users had more possibilities to interact with the digital furniture within the *IKEA* app, could have led the *IKEA* participants to focus most of their attention on the interaction rather than the augmentation, which in turn increased their emotional reactions to the interaction. We further argue, that the high degree of playfulness with regards to interaction emerged, due to the fact that the candidates did not consider the digital furniture linked too closely to their perception of themselves. This allowed them to re-purpose the app for their own enjoyment and turn it into a game in which they used products as they wanted, compared to how they were intended to be used. In contrast, due to the closeness of the augmentation to one's identity, participants applying digital makeup took the experience a bit more seriously. Nonetheless, *IKEA* candidates did consider the AR as a potential source of information about *IKEA* products, and found that due to the quality of the augmentation and the interactive resizing option information was lost (see 9.2). Surprisingly, however, this did only evoke slightly negative feelings of annoyance, criticism and boredom.

We believe, that this is because of the fact that consumers still perceive AR as being an innovation, and consequently by definition as being novel (Wells et al., 2010; Olsson & Salo, 2012). While researchers discovered that consumers do expect their experience during their CDJ to be interactive, immersive and intuitive (Wang & Yu, 2015; Olsson et al. 2011; Spreer & Kallweit, 2014), innovation adoption research found that consumers are more lenient towards technological malfunctions in innovative technology (Bradford, 2003). As consumers' expectations strongly impact their experience, and most consumers do not anticipate novel technologies to work flawlessly (Gentile et al., 2007, Heeter, 2003), they presumably only felt slightly negative emotions with regards to AR.

Consequently, we argue that when our *IKEA* test subjects encountered registration errors within their experience, these elicited only moderate levels of criticism, which did not influence their overall experience too much. Conversely, *L'Oréal* candidates showed slightly positive emotions towards the good registration, which we argue were due to the perceived novelty of the technology. Hence, these findings affirm our belief that registration acts as a hygiene factor to the consumer experience (Herzberg, 1974).

We propose that the few positive emotions participants from both studies exhibited with regards to registration were due to the novelty of AR as well as the fact that their expectations towards the registration quality were exceeded. Innovation research did prove that perceived novelty evokes positive emotional reactions such as excitement and interest (Wells et al., 2010). Hence, we further assume that the slightly explorative behavior we observed in *L'Oréal* candidates with regards to registration, can be understood as triggered by curiosity emerging from the novelty of AR. O'Mahony (2015) cautions that positive emotions with regards to branded AR experiences are frequently not due to the application providing actual value, but based mainly on the hype of experiencing a new technology. Consequently, we need to be aware that our results regarding the emotional dimension of the search and evaluation behavior might be affected by the novelty of AR. The findings of a study by Yaoyuneyong (2016) suggest that the novelty of AR generally elicits fun and excitement within consumers, while Olsson & Salo (2012) found mostly fascination and amazement to arise from the perceived novelty of AR. Considering that the dominant emotions we found with regard to interaction and augmentation were surprise as well as playfulness and joy, we presume that the likelihood of these emotions being prompted by the novelty of AR are quite high. Particularly the feeling of surprise can be argued to stem from the novelty of the technology, as it appeared most strongly the first time participants encountered the interactivity characteristic or augmentation and faded in strength the longer the participants used the applications.

Therefore, we assume that the degree of positive influence we found on the emotional dimension of the search and evaluation behavior will most likely decrease, as consumers get more used to AR

and the effect of novelty disappears (Berlyne, 1970). Once consumer got accustomed to the interactive feature of smartphones, for instance, they no longer felt notably joyful or excited when interacting with their touch screen, though in the beginning they surely were. On the contrary, once the novelty of the smartphone had worn off, people began feeling frustrated at technological failures of the device (Digital Commerce 360, 2016). This trend can already be observed in the AR experience with regards to registration errors. Towards the end of their experiences some participants were beginning to show first slight signs of annoyance at encountering faulty registration, which further highlights the fact that novelty is perceived subjectively and its impact will thus vary from person to person (Wells et al., 2010; Javornik et al., 2016). Moreover, we did find that our youngest test subjects, who consider interactive technologies as most common and are thus least likely to be impressed by the novelty of AR, exhibited less strong emotional reactions to the AR application.

Nonetheless, we do not expect the positive impact of AR on the emotional dimension of search and evaluation behavior to disappear completely. We do believe that particularly the emotion of joy evoked by the augmentation cannot be solely attributed to the perceived novelty of AR. We accredit at least parts of this emotion to the fact that the augmentation provided the participants with a safe environment for self-reflection, which in turn prompted a feeling of pleasure and joy (Belk, 2013). The same is true for the slight feelings of ironic amusement and entailing fun we found when *L'Oréal* candidates observed themselves with augmented makeup, and the feeling of satisfaction *IKEA* interviewees expressed at making a digital product fit into their personal surroundings. In conclusion, though our findings may have been affected by the novelty of AR, we still assert that both interactivity and augmentation have a positive and lacking registration a negative impact on the search and evaluation behavior of consumers making a purchase decision.

9.2. Augmented Reality and the cognitive dimension

When deciding on whether to purchase a product, consumers engage in rational choices, which are influenced by the cognitive dimension of the user's experience, which in turn is linked to search and evaluation activities (Janiszewski, 1998). The findings from our research demonstrate that AR does impact these activities by increasing explorative behavior of consumers. However, our results regarding whether AR facilitated information processing and thus improved consumers' understanding of the products were mixed.

Where augmentation is concerned our case studies portrayed different results regarding whether augmentation would have a positive impact on the cognitive dimension of the consumer experience. For *L'Oréal* it was not verified, whereas for *IKEA* it was slightly supported. Nonetheless, we did find that the augmentation of the participant's personal context led to consumers expanding their search activities in both studies, which is in line with the research of Javornik et al., (2016) about in-store makeup AR applications' impact on the consumer experience. Hugues et al., (2011) maintain that the visual placement of virtual information gives consumers additional information. We believe that this increases the value of the time spent with the app, which in turn will serve as an incentive for the consumer to explore the products within the app further. Moreover, we argue that consumers expand their explorative behavior due to the fact that they experience positive emotions when augmenting themselves or their personal environment, which increases their level of involvement and immersion (Olsson & Salo, 2012; Hoffman & Novak, 2009; Gao et al., 2009; Hyun & O'Keefe, 2012). This in turn makes them more willing to spend more time with the app (Krohmer 2012; Hyun & O'Keefe 2012).

Our findings did reveal that augmentation enhanced the immersion of our test subjects at least to some degree. According to Dick & Basu (1994) this should have then resulted in the participants accepting the provided information more readily. However, we found that the perceived lack of realism prevented the candidates from experiencing the augmentation as helpful and thus they frequently rejected the information gained through it. This was particularly true for the participants of

the *L'Oréal* study, though it was also observed in the *IKEA* study albeit to a lesser extent. These issues with realism combined with the occasionally poor level of technological quality negatively impacted the value of the information collected. *L'Oréal* participants repeatedly criticized that the augmentation did not look good and stated their doubts as to whether the products would appear the same way in reality. *IKEA* candidates generally considered the information from the augmentation to be more valuable, but strongly disapproved of being able to resize furniture, which detracted from the informational value as well as realism of the digital products. Hence, we argue that the understanding of the product would be positively influenced by augmentation, if the extractable information, which is tightly connected to realism, would not be negatively impacted by the technological quality of the apps. Carmigniani & Furht (2011) support this assessment by postulating that in order for a digital product to provide any value to the AR user, it needs to appear completely realistic and create the impression that the user is looking at the actual physical product.

Thus, the level of realism in augmentation plays a big role with regards to the effect of augmentation on the cognitive dimension of the consumer experience and subsequently on the purchase intention of the consumer. Nonetheless, we do believe that its impact depends on the product and its relation to the consumer's identity. As mentioned in section 9.1., the *L'Oréal* app addresses the consumer's self more closely. Hence, *L'Oréal* users were very critical when the makeup was not perceived as real. On the other hand, for *IKEA*, which is less closely linked to the consumer's self-understanding, the lack of realism in furniture was perceived less strong. Surprisingly, these findings are in direct contradiction to the research of Tam & Ho (2006), who argue that users are less critical with self-referent content, though our results do support their assertion that consumers pay more attention to such content. In conclusion**,** we do believe that if the realism and technological quality of the apps will be improved augmentation will have a positive impact on the cognitive dimension of the experience.

From both our case studies it emerged that interacting with the digital products positively affected the cognitive dimension of the consumer experience. Our results revealed that interactivity did lead

participants to expand their explorative search behavior, as suggested by Huang (2015), who found that the vivid memories evoked in users of interactive technologies encouraged explorative consumption. We did find that interaction occurred both with the augmented content and the device itself, and that both types of interaction evoked explorative behavior. Further, the interactivity of AR made the interviewees perceive the experience of gathering information as more entertaining and fun, hence generating a deeper level of immersion and concentration. These findings support former research proposing that interactive technologies made users feel more immersive and created a state of '*flow*' within consumers, which allows them to focus better (Hyun & O'Keefe, 2012; Javornik, 2016).

This concept of flow is argued to also increase the consumer's ability to learn and absorb information (Javornik, 2016). Within our research, we did see this at least partly confirmed, as our findings did reveal that consumers did to some extent feel like the interactivity allowed them to gather more valuable information through exploring the product in a physical way, which in turn increased the awareness of their surroundings (Olsson & Salo, 2012). This is further in line with the insights we gained from the research of Spreer & Kallweit (2014) on AR's role in retail at the point of sale.

However, our literature review did not prepare us for the fact that the impact of interactivity would vary based on the product class considered. With *L'Oréal*, interactivity weighed considerably less in the eyes of our test subjects. Interacting with the digital makeup did not really assist the participants in making their purchase decision, as even though they found the experience to be fun, the candidates did not gain the information they needed about the product through interacting it. Facial expressions, for instance, do not provide additional information about digital makeup. The type of information consumers buying cosmetics are searching for are in fact more related to augmentation, i.e. to how the makeup would look on their faces. Instead the *IKEA* candidates were provided with more relevant information when interacting with the digital furniture. By circling the products or placing them in the correct space within their room, participants gained valuable information pertinent

to their decision. However, the value of the gained information was limited by the poor technological quality and the negative impact of the resizing option.

Regarding registration, we initially assumed to find fewer results as we presumed registration to act like a hygiene factor, which implicated that results on the topic would emerge only when there was a lack of registration in the app (Herzberg, 1974). However, this assumption proved to be false. The *L'Oréal* study revealed that also good registration played a slight role in increasing explorative behavior due to the fact that consumers would evaluate the registration precision level as well as the technological quality by choosing more products in an effort to observe how far they could push the technology. Yet, we argue that this behavior is strongly linked to the novelty of the technology. As users are not used to encountering registration on a daily base they are curious to study its effects (see section 9.1). In contrast, the *IKEA* case showed that lack of registration did have a negative impact on the user's cognitive dimension, by leading to reduced immersion, loss of valuable information, and a diminished perception of the product. This supports the theory of Bajura & Neumann (1995) which states that without accurate registration, the informational value of placing this information in a specific situation would get lost and the consumer's understanding of the product would consequently lessen.

Overall, we believe that the technology supporting AR is still not developed enough to offer a completely realistic experience and project digital content that looks and feels real. This does undoubtedly limit the positive impact that augmented content has on the cognitive dimension of the user when perceiving the product and elaborating information (Azuma, 1997). The inadequate technology distracts from the value the augmented information could otherwise have (Drascic & Milgram, 1996). Therefore, we argue that with improved technological standards AR will positively impact the cognitive dimension of the user's experience. This is particularly important because as we argue in section 9.1. the emotional impact of AR will lessen when the novelty of AR diminishes, and then consumers will use AR with more goal-oriented and utilitarian motives and thus engage in more cognitive processes when making decisions.

Chapter 10: Conclusion

This study attempted to understand how mobile AR influences the search and evaluation behavior of consumers during their decision-making. In order to achieve this, we inspected how the three AR media characteristics, augmentation, interactivity and registration, impacted the emotional and cognitive dimension of the consumer experience during search and evaluation. The findings from our research show much promise for using mobile AR in marketing. This medium is able to create an enhancing experience, by generating positive emotions and creating a better understanding of the product. However, for AR to develop its full potential, its integration into the consumer journey is crucial.

10.1. Managerial implications

The findings of this study have several implications for marketers considering whether they should invest in AR as a brand communication tool. Firstly, we did find that mobile AR positively influences search and evaluation behavior of consumers. Consumers enjoyed their experiences with AR and overall did feel positive emotions during the experience. This positive brand experience also influenced their immersion, which in turn led to consumers exhibiting explorative behavior, prolonging the time consumers spent with the brand. In today's world, where consumers make purchase decisions within a few seconds and switch between brands frequently, this is of immense value. In conclusion, mobile AR possesses considerable promise as a marketing tool for companies.

However, our findings do suggest that some strategic thought needs to be put into designing the AR application in order to leverage its full potential. First and foremost, the AR app needs to supply the consumer with some kind of value, if the marketer wants to avoid the consumer perceiving the app as a simple gimmick and discarding it after a few minutes. Our study proves that AR as a medium performs highly on providing consumers with both hedonic and utilitarian value. In fact, part of the attraction of AR for brands is that it closely links the two. Nonetheless, the marketer needs to put

special focus on the type of value, which will let him achieve the communication aim he pursues with the AR application. Should the marketer intend to increase the brand perception of consumers, he should primarily pay attention to increasing the hedonic value of the AR experience, whereas if he plans to convey product knowledge, the experience should be designed towards increasing utilitarian value.

Depending on which type of experience the marketer aims to construct and which value he aims to create, he will need to pay varying levels of attention to the different media characteristics of AR. For instance, our study suggests that when attempting to create a more emotional and entertaining experience, the marketer should particularly take the brand's role in the construction of the consumer's identity into account. Within our research, we found that consumers reacted more strongly to and placed higher value on augmentation compared to interactivity, if the product was closely associated with their self. Furthermore, they took the experience more seriously and were less likely to turn it into a game. However, if the product was considered farther away from the consumer's identity, they were more playful and increased their interaction with the app. Hence, these considerations indicate on which AR media characteristic the marketer should place higher focus when designing the app.

If the brand, on the other hand, intends to provide a more informational experience, which provides the consumer with real utilitarian value in terms of making a purchase decision, the main concern of the marketer should be the type of information supplied by the app. Here, the marketer should contemplate two distinct issues. Firstly, he needs to review which type of information the consumer is looking for when evaluating the brand's product class, and secondly how this information can best be transferred to the consumer. Do consumers gain valuable insights about the product by interacting with the digital product, and if so, which type of interaction best delivers the needed information? Or does the consumer mainly elicit helpful information from observing the augmentation and its setting in his surroundings? Depending on the answers to these questions the marketer should invest in and utilize these AR media characteristics to differing degrees in order to develop a

solution, which delivers highly valuable information and thus satisfies the consumer's needs the most.

With regards to this, it is important to bear in mind that AR can offer completely new ways of communicating information. For instance, it allows the marketer to integrate the consumer's personal surroundings into the experience. This can both be a great opportunity for the brand, as it allows a novel type of information to be gained from the experience, as well as a challenge, as it places the control over the brand experience into the hands of the consumer and unpredictable external forces related to the consumer's surroundings. Moreover, AR can be achieved through different technological means. In our study, we investigated magic mirror and geo-layer AR with markerless technologies. However, other kinds of AR, such as active printing or bogus windows, as well as marker-based technologies might better fulfill the purpose the brand wants to achieve with AR.

A further key learning brands should take away from our research is the importance of the technological quality of the AR application for the value of the consumer experience. Marketers need to be aware that though currently consumers might still be rather lenient towards technological errors in AR, the technological quality will still considerably influence the worth of the AR app to the consumer. Technological failures impair the value of information consumers gain from the experience as well as their feeling of immersion, and consequently their explorative behavior. From our study, we gained that faulty augmentation and the resulting lack of realism considerably dampened the positive effects of AR, and lacking registration actually negatively impacted the experience. Especially, when the AR app addresses the identity of the consumer intimately, the consumer will be influenced by the technological quality and react forcefully to faulty quality. Consequently, we highly recommend the brand to invest in developing a high-quality application, as otherwise it runs the risk of negatively impacting the brand image with a negative AR experience.

Another topic that needs to be contemplated by the marketer when considering AR is the topic of novelty. Currently, AR is still perceived by the mainstream consumer as innovative and novel. This view can, in the short run, have considerable benefits for the brand. Utilizing AR will give it an image of being innovative and creative. Also, consumers have not yet developed defense mechanism or skepticism against AR, and are, therefore, more open and positively inclined towards the new medium. They still see it as an entertaining medium, and are more forgiving of mistakes, as our findings prove. However, companies need to keep in mind that like with other technological innovations, the novelty of AR will in time dissipate and consumers getting more used to AR will change their reactions and behaviors towards it. Additionally, marketers need to recognize that the technology of AR is still developing and has not yet arrived at one standard in the mainstream market, which can pose both opportunities and challenges for early movers – just like with any innovation.

Finally, marketers need to consider how their AR initiative will integrate with their overall marketing strategy. As mentioned before, consumers do not distinguish among brand touchpoints, and consequently expect to encounter a consistent brand experience. Moreover, as our findings indicate consumers are not yet willing to use AR as their only source of information. Many still value the information they gain from store experiences. Hence, we argue that AR can supplement other channels of communication and sources of information, but not substitute them.

10.2. Academic contributions, limitations and future research

This research has sought to contribute to the body of knowledge surrounding the use of AR in marketing by investigating how mobile AR impacts the search and evaluation behavior of consumers. Towards this aim, we reviewed existing literature on AR and its experiential value in marketing, and used this as a basis for our research.

Overall, we found that mobile AR has a significant influence on both the emotional and the cognitive dimension of the consumer experience during search and evaluation. AR elicits positive emotions with varying degrees of strength depending on the type of product and its relation to the consumer's identity. Moreover, AR increases the user's explorative behavior and provides valuable information, which in turn improve the consumer's understanding of the product. Our research further expands on the findings of Javornik (2016) regarding the impact of the AR media characteristics on consumer behavior by providing new insights in relation to search and evaluation behavior when making a purchase decision. Both interactivity and augmentation were found to positively influence the emotional and cognitive dimension of the consumer experience. Further we argue that registration acts like Herzberg's hygiene factors, only impacting the experience when lacking, and then negatively. The findings with regards to registration address a key theoretical gap, by looking into the influence of registration on consumer perceptions and behavior. Lastly, the influence of all three AR media characteristics was found to be affected by the application's technological quality, which we discovered to be of significant importance to the consumer's experience.

Future research. The findings of this study hold relevant implications for future research in the field of AR in marketing. More specifically, our research has shone a light on several subjects within the topic, which still have to be studied in more detail. For instance, we found within our paper that the type of product, and more specifically how it was tied to the consumer's identity, played a role for how the user perceived the AR experience. We believe, this deserves further investigation. Another aspect that influenced the consumer's experience was the level of realism. Though our study did provide some initial evidence of the relevance of this factor, more extensive research is required. Moreover, seeing as we limited our research to the search and evaluation phase of the CDJ, we suggest future researchers to look into how AR impacts the other phases of the consumer decision-making, namely need recognition and post-purchase.

Furthermore, during our literature review, we discerned that most work within the AR research community focused on the emotional side of the AR experience, whereas the cognitive dimension has been less analyzed. Therefore, we recommend deeper studies into the influence of AR on the cognitive settings of the consumers. Another topic which has been overlooked by researchers so far, is the AR media characteristic of registration. While there are some papers on the role of interactivity and augmentation for the overall AR experience, there are little to none on registration, particularly not with regards to its psychological impact. In our work, we argue that the slight influence of good registration on the emotional dimension is due to the novelty of the medium. However, this is simply based on assumptions, and we consequently propose further analysis of the issue. Concerning the AR media characteristics, we suggest that future research could also look into how different types of interaction influence the CDJ, as our results indicate that this might have an impact. This, for example, could be achieved with the help of neuro-marketing research tools to gain a better understanding of the psychological process addressed by the media characteristic.

Finally, within our study we used a specific segment of the population, consisting of millennials from different countries and cultures. It would be interesting to observe if our results still hold for consumers outside our segment, for example older or younger generations or consumers from non-Western cultures. Particularly, whether the cultural heritage of the consumer impacts how consumers perceive and react to AR would be of interest.

Limitations. Although providing intriguing insights, our study is not without limitations. One limitation is that, due to simplicity and resource considerations, we focused our research exclusively on the emotional and cognitive dimension of the consumer experience, purposefully excluding the social dimension, which as it is related to external variables is much more difficult to control for. While we do recognize that this dimension exerts considerable influence on the consumer, we wanted to concentrate mainly on the internal psychological processes of the consumer in a more general way, avoiding cultural and individual biases. It could also be criticized that we did not repeat our study multiple times with the same participants to get a better understanding of the impact of AR on the

consumer without the effect of novelty. We consciously did not, however, control for novelty in this way, because currently the novelty of AR does have an impact on the consumer and this is important for brands to consider when making the decision of investing in AR at this point of time. Nonetheless, further research concerning the impact of novelty is necessary.

Moreover, another limitation of our research is that some participants in our sample were not actively considering purchasing the product classes of our two cases at the time of the study. Therefore, we asked them to imagine being interested in purchasing furniture or makeup when experiencing the app in order to understand if it could impact their purchase intentions. This measure triggered more awareness of their search and evaluation behavior amongst our participants, while they were using the app. Consequently, we did not observe any different reaction of these individuals compared to the ones who were actually making a purchase decision.

Furthermore, our study could have used a control group to better distinguish the impact of AR apps compared to normal mobile applications. However, it would have been difficult to find applications, without an AR feature, similar to our case apps. Therefore, it would have been challenging to set up proper testing conditions and the effectiveness of the control group would have been limited. Also, as our results are based on two specific industries, the generalizability of our findings to other industries is limited. Our research does suggest that the product type does play a role in how AR affects the consumer. Consequently, it can be assumed that the impact of mobile AR will vary from industry to industry.

Another limitation regarding the generalizability of our results concerns the size and heterogeneity of the sample we conducted our analysis on. Due to resource considerations, we only used a small number of participants for our research, which restricts the generalizability of our results. However, we did attempt to increase the quality of our research by administering our study to a more diverse group of people, including different nationalities and occupations. Nonetheless, the heterogeneity of our sample could be criticized when considering the target population. In our study, we looked at

millennials as a specific target group, due to their distinctive technological expectations. Moreover, our sample participants all belonged to families with medium to high income and were born in western cultures. We do believe this affects the generalizability of our findings to the target population and recommend further research with a more diversified sample.

Finally, due to the fact that our interviewees belonged to different nationalities, we conducted the interviews in English. However, as some participants did not feel confident in speaking the language, we allowed them to answer in their mother tongues to better observe their natural reactions and make them feel more at ease with the observational conditions. Yet, we do acknowledge that this might have introduced some language biases.

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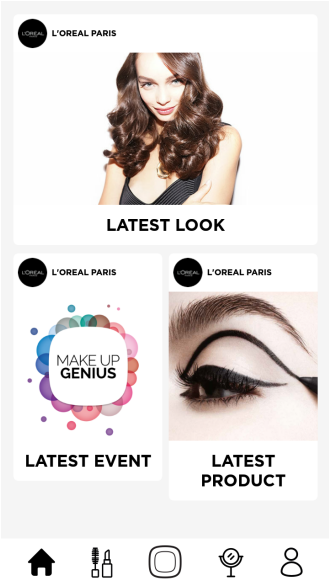
Appendix

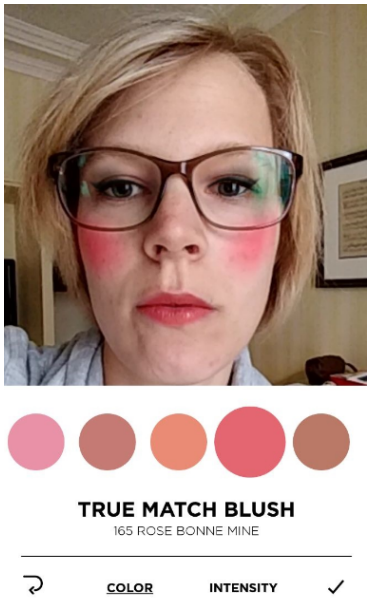
Appendix 1: AR application screenshots

1.1. L'Oréal



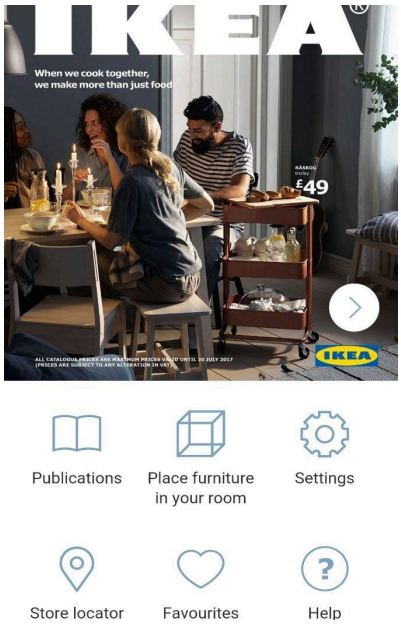
Home Page

Augmented eye linear

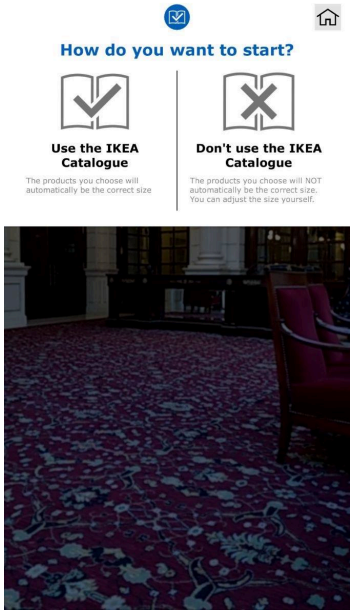


Augmented Blush

1.2. IKEA



Home Page



Two options available

Augmented furniture

Appendix 2: Interview design

2.1. Part 1: Semi-structured interview

1. Please describe your experience.
2. If you have to describe the experience in just one word, what would that be?
3. What did you like the most, and what did you dislike the most?

2.2. Part 2: Structured interview

Overall experience

Please rate your experience.

Lowest (1) ☐ ☐ ☐ ☐ ☐ *Highest (5)*

How likely are you to use this app again in the future?

Very unlikely (1) ☐ ☐ ☐ ☐ ☐ *Very Likely (5)*

How likely are you to buy an IKEA/ L'Oréal product the next time you buy furniture/ cosmetics after using this app?

Very unlikely (1) ☐ ☐ ☐ ☐ ☐ *Very Likely (5)*

How helpful would this app be when making a purchase decision?

Very un-helpful (1) ☐ ☐ ☐ ☐ ☐ *Very Helpful(5)*

The app gave me information about a new product that I would like to try out.

Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

The app made me experience ... emotions.

Negative (1) ☐ ☐ ☐ ☐ ☐ *Positive (5)*

The app succeeded in involving me.

Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

The app influenced my interest in the brand …

Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

Augmentation

Seeing the digital content projected on myself/ in my personal surroundings…

- impacted my overall experience …

Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

- made me feel the below mentioned feelings.

	Strongly	*Slightly*	*None*
Playful	☐	☐	☐
Positively surprised	☐	☐	☐
Empowered	☐	☐	☐
Joyful	☐	☐	☐
Sad	☐	☐	☐
Critical	☐	☐	☐
Annoyed	☐	☐	☐
Bored	☐	☐	☐

- made me want to try more products than I usually consider.

Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- made me want to use the app for a longer period of time

Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- made me feel immersed.

Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- assisted me in making a purchase decision.

Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- provided me with information that was …

Useless (1) ☐ ☐ ☐ ☐ ☐ *Valuable (5)*

- influenced my understanding of the product …

Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

- influenced my intention to purchase an IKEA / L'Oréal product the next time I need to buy furniture/ cosmetics.

Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

Interactivity

Interacting with the digital content…

- impacted my overall experience …

  Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

- made me feel the below mentioned feelings.

	Strongly	*Slightly*	*None*
Playful	☐	☐	☐
Positively surprised	☐	☐	☐
Empowered	☐	☐	☐
Joyful	☐	☐	☐
Sad	☐	☐	☐
Critical	☐	☐	☐
Annoyed	☐	☐	☐
Bored	☐	☐	☐

- made me want to try more products than I usually consider.

  Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- made me want to use the app for a longer period of time

  Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- made me feel immersed.

  Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- assisted me in making a purchase decision.

  Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- provided me with information that was …

  Useless (1) ☐ ☐ ☐ ☐ ☐ *Valuable (5)*

- influenced my understanding of the product …

  Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

- influenced my intention to purchase an IKEA/ L'Oreal product the next time I need to buy furniture/ cosmetics.

  Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

Registration

The registration of the digital content …

- impacted my overall experience …

  Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

- made me feel the below mentioned feelings.

	Strongly	*Slightly*	*None*
Playful	☐	☐	☐
Positively surprised	☐	☐	☐
Empowered	☐	☐	☐
Joyful	☐	☐	☐
Sad	☐	☐	☐
Critical	☐	☐	☐
Annoyed	☐	☐	☐
Bored	☐	☐	☐

- made me want to try more products than I usually consider.

  Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- made me want to use the app for a longer period of time

  Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- made me feel immersed.

  Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- assisted me in making a purchase decision.

  Strongly Disagree (1) ☐ ☐ ☐ ☐ ☐ *Strongly Agree (5)*

- provided me with information that was …

  Useless (1) ☐ ☐ ☐ ☐ ☐ *Valuable (5)*

- influenced my understanding of the product …

  Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

- influenced my intention to purchase an IKEA/ L'Oréal product the next time I need to buy furniture/ cosmetics.

  Negatively (1) ☐ ☐ ☐ ☐ ☐ *Positively (5)*

Participant

Age

Nationality

Are you intending to buy furniture/ cosmetics right now?

- ☐ *Yes*
- ☐ *No*

Is the brand personally relevant to you?

- ☐ *Yes*
- ☐ *No*

How often do you buy furniture/ cosmetics?

- ☐ At least once a month
- ☐ At least once every three months
- ☐ Once a year
- ☐ Never

Have you used this app before?

- ☐ *Yes*
- ☐ *No*

Are you interested in apps in general?

- ☐ *Yes*
- ☐ *No*

Have you had experience with AR before?

- ☐ *Yes*
- ☐ *No*

How often have you used Augmented Reality before?

- ☐ *0x*
- ☐ *1-5x*
- ☐ *More than 5x*

Appendix 3: Transcripts

3.1. L'Oréal

3.1.1: L1

Name: L1
Gender: Female
Nationality: Italian
Age: 24
Other demographics: Student

Observation

Location: University
Lighting: Bright Lightening
Overall Impression: The interviewee was playing around with the products/colours/Intensity.
She started with the eyes, was surprised and happy about the effect. She was having fun and curious in trying different products. She tried make up on all the parts of the face. No more then a couple of products for part. And then the pool of products

0:45min
Looks at the home page, tries to get an overview of the different features.
Explores the different parts of the app.
Puts the phone in front of herself and scans the face
1:07min
Start from the eye section
"So I would like this super eyeliner, wow, it's works great. It's realistic!
1:30min
Makes a surprise face and smiles. Chose the Lipstick tab. "Aww, I want to try this one. Ok, it's weird!"
1:49min
Moves the phone closer and further away to position the make up on the face.
Scrolls among different types of eyeliners.
"What if I want to remove the eyeliner? I want this one and black colour.
2:20min
The app goes back to the initial page
Starts again from the single products
Trying to understand how to navigate across the app
2:46min
"Let's try the blush." Aww, too much intense"
Tries to change intensity
Has a surprise face. "This is not realistic"
3:01min
"It's a bit difficult to understand how to use this tool. Why i can't change intensity and it constantly asks me to scan the face"
taps the phone and is a bit annoyed.
3:45min
Moves back to gloss and lipstick section.
"I like the gloss, Ok looks good".
Tries to understand where the shopping chart is?
"So how can I buy them? Ah, here. nice."
4:11min
Moves to the Mascara section.
"I used to use this mascara. I want to see the effect".
Moves her face around puts her hair back her ears
"It's similar, nice"
4:44min
Moves back to Gloss section
"Gloss, why is it orange? Ok, I need to eliminate some products I guess. I was using a multilayers".
5:25min
Looks through all the products and information
"I want to try some eye shadow. Is there anything?"

5:40min
Back to the eye linear
“Lets try the Eyeliner again. Wow, I like it.”
smiles and put the phone closer and turns her head right and left to see the effect
6:00min
Navigates the app. Looks for how to delete the products.
“How do I take the lipstick off? Oh here, ok.”
6:25min
It doesn’t understand my skin/hair colour right? So it doesn’t customize on me,
7:00min
Combo of products are the last ones missing.
She tries the rebel chick combo, and smiles.
7:05min
End

Interview

Question 1: Please describe your experience with the app.
It’s a very useful application. I like make up but I don’t want to spend much on it. So first i want to see if that product fits me and when you go to a shop you can’t always try everything. It’s good that with the app you can try it first.

The app is not that much realistic however. When you really try make up on you the effect is quite different. It’s useful but maybe for a first impression. I understand the overall idea, but then I think i wouldn’t buy make up online because i tried it here. I would still prefer to go to a make up shop and try it on me.

Question 2: What is the first word that comes to mind when you think of your experience?
Make up 2.0

Question 3: What did you like/ dislike about the app?
I like I could try it on me and have an impression on how make up looks. I liked the eyeliner, I think they were very precise. I liked less the lips part, not realistic at all. Also it wasn’t always easy to navigate through the app.

Comments during conversation

- It’s a bit difficult to understand how to use it. I want to change intensity and every time it asks me to scan the face.
- In reality I used to use this mascara, and the effect its pretty realistic.
- I think the lipstick it’s a bit intense, doesn’t really fit me style.

3.1.2: L2

Name: L2
Gender: Female
Nationality: Italian
Age: 24
Other demographics: Student

Observation

Location: University
Lighting: Natural Lightening
Overall Impression: The interviewee was looking at the products and understanding how to put it the shopping bag. She first tried the combo of products proposed by L’Oréal. Then she moved on the single products. She was surprised when she saw the eyeliner on her. She really liked it and play around with the other products. It wasn’t immediate to navigate the app. She always had to start from the beginning or ask how to go where. the app would often ask to scan the face, which was impacting negatively the experience. She was surprised seeing that make up would move with her facial expressions.

0:44min
Dives into the products
“So I want to try this lipstick. I click on it and try it. - Aww, ahaha. I don’t like it. I want to change colour. - So here I can change intensity and colour. Cool!”
1:31min

Looks for the shopping chart.
“What if I want to buy it? Oh, here. Nice, just like a wishing list”
1.45min
Scrolls through the main page and focuses on the looks.
“What is this? Here they propose looks! Nice, I like it.”
Surprise and curiosity on her face
2:19min
Moves in eye section.
“Here’s the eyeliner. Let me take off the glasses. Nice I like it, it puts it on me. It recognises my eyes pretty well.”
Satisfaction and surprise
2:52min
Remains in the eye section
“This mascara I know it, it’s a competitor of my company. Let me try it, I like it, I like the effect. The shape goes a bit up.“
She puts the face closer to the screens to observe better the effect.
3:31min
With curiosity looks at where the shopping bag.
“So I want these three products, nice” “Where is the shopping bag?”
3:50min
Goes back to the main page
So what is this “scan” a product? I can actually have access to more choices throw this system.”
4:10min
Annoyed and concentrated
“How can I go back to the first page? Can you help me?”

4:26min
Looks at the products available and information tab.
“This tool is just for the face right? You don’t have it also for polish nail? It would be great if you could coordinate your lipstick colour with your nail polish nails for example. It would be cool to try it”
5:26min
Is there also a concealer option? The only thing here is the blush. So you have descriptions and shades available. oh, ok, cool.
6:00min
Reads the information and news.
“Ok, so it gives you also the latest products”.
6:19min
Taps in the middle.
Discovers the picture and filters
“You can share it. This blush is too intense. Again let's try a new product. Ok and then I can download the picture or put a filter on, so i can share it. Cool, this is very nice. Also for L’Oréal, if you could have a description of what you have on your face it could be useful in order to share relevant information
7:30min
End

Interview

Question 1: Please describe your experience with the app.
I liked the overall experience. I was surprised in seeing how the makeup would stick on my face. I also had one of the mascara offered and the effect it’s pretty realistic.

Question 2: What is the first word that comes to mind when you think of your experience?
Glamour

Question 3: What did you like/ dislike about the app?
I liked the fact that I could feel how the make up would look. I didn’t like that there were very few products

Comments during conversation

- It could be nice to have an app for nail polish where you can coordinate the colour together with the lipstick and see how it looks like.
- It’s nice you can share the pictures, cause you spread Wom. It would also be nice if with the picture you know which products you used, so people can immediately know the type of product chosen.

3.1.3: L3

Name: L3
Gender: Female
Nationality: Italian
Age: 24
Other demographics: Student

Observation

Location: University
Lighting: Bright Lightening
Overall Impression: The interviewee was playing around with the products/colours/Intensity. She was surprise and positive about the experience. She started with lips, eyes, and blush. She tried to make up on all the part of the face.

1:30min
Scrolls quickly through the app.
First main page and then single products.
"Can I give a first suggestion: It's better to put the face cosmetics at the top of the list and this are the first products you can try".
2:15min
Dives into the eye section.
Moves the phone closer and further from the face to check eyeliner precision
"Let's try the Mascara. Aww nice. Let's try the eyeliner. Cool."
2:45min
Moves to the Lip section.
"Lips. ok. You know what? I can't understand the difference among the products… I don't know how do they differ. Information should be more clear. As I'm not an expert I don't know the difference.
Moves to eyeliner
She looks at the eyeliner results: "Aw, WOW!"
3.15min
Scrolls through all the eyes products.
After trying different eyeliner products. "Wow, it gives the idea. It's fun".
3.43min
Tries different eye products.
Moves phone closer and further, widens the eye to observe changes
"Eyes. I really like this part, it's so precise."
3.55min
Looks at all the products.
Spends more time on the eye section then any other one.
"...Eyes done, Lips done. Let's try the Mascara. I really like it, it gives the idea"
4.25min
Scroll through the app and touches randomly features. ".....And here I can share a picture with my friends, nice"
4.50min
Looks. I think that Eyes cosmetics are perfect and the Lips ones should be less strong. It's not really me, but it's nice as it gives me a general idea.
5.10min
Ok, so I think I tried everything.
5.15min
End

Interview

Question 1: Please describe your experience with the app.
I really like it. It's not really me, but I can imagine me better with this. It's fun to play around with it and try on different products and explore the application.

Question 2: What is the first word that comes to mind when you think of your experience?
Strange but also interesting. It was something new.

Question 3: What did you like/ dislike about the app?
I like for eyes that it was real. It helps me to understand how I can put make up on. I think they should show different kinds of style with the same product.
I didn't like the colours on the lips, too strong and not realist.

Comments during conversation

- It gives the idea.
- I like the effects on the eyes. It's good, it gives the idea
- Eyes are perfect, lips should be less strong.
- As I don't know all the differences among the products, it could be nice to know them clearly.

3.1.4: L4

Name: L4
Gender: Female
Nationality: Italian
Age: 21
Other demographics: Student

Observation

Location: University
Lighting: Natural Lightening
Overall Impression: The interviewee tries one product at the time. As the scan doesn't always works perfectly, she makes different facial expressions in order to put the make up in line with the face and bring the phone closer/further away from her in order to find the right match. The interviewee is completely immersed and focused on the screens. She's very sceptical across the entire experiment.

0:36min
Looks attentively at the L'Oréal icon.
"Is this from L'Oréal? You don't even understand it from the app".
1:03min
Moves the phone closer and further away from the face.
Tries to scan it.
Has to do it twice.
1:18min
"I want to try the eyeliner? Oh my God, what is this? I can't change the shape of eyeliner? I look crazy."
Makes critical expressions and pulls the faces to understand the fit of the product.
Dissatisfaction emerges from her look
2:01min
The app goes back and has to scans again.
"Let's try the lipstick, this fuchsia one. Wait, It doesn't work".
Some seconds pass in order to the app to recognise the face "I wouldn't like any colour. Lets try this one. Aw, I'm embarrassed. I can't see myself like this".
2:58min
Changes section and moves to the combination of looks
"So and this is the combination of looks. I really don't like the gloss."
She moves her face around and pulls faces.
"This is not realistic at all".
3:45min
"Let's go back to the eyeliner. There are different ways to put eyeliner on and here they offer just one type. For example what is this thing? Oh my God, this is not real."
She widens her eyes and pulls the phone closer and further. She's very negatively surprised.
4:50min
Goes back to the looks.
"I'm curious, let's try this Rebel Chick Look" "This would work if I want to be a drag queen. Oh my God…"She makes funny faces and laughs.
5:14min
Changes to the Nude Look. "This is more like me, let me see.
"Lets try the nude look". "Ehm, ok! A little bit more realistic" - "So i have to go back, ok."
5:30min
Goes back to the products section.
"Aww i want to try the mascara. Also, What does intensity mean? How many times you put make on."
Plays with the intensity and colour tab
6:13min
Touches the central point. Ok so here you can also save a picture of you.

6:26min
Goes back to single products
“Lets try again to put on this lipstick and this colour. What does gloss intensity mean? How many times I put it down? I’m skeptical, because it’s difficult to imagine a product through this tool. It’s fun cause you play with it, but I can't understand how someone would buy cosmetics just after using this”
7:20min
Looks for the trash basket.
She’s figuring out how to eliminate products from the bin.
8:10min
“If I try the mascara. This looks like i put fake eyelashes. Now, if I want to buy mascara I need to try the brush. This does not incentive me to buy it.”
9:00min
“It automatically puts the products in the shopping bag, it’s tricky.”
9:30min
“I would never use this app to shop. I need to go in the shop to buy cosmetics. Ok so it kind of recognizes your face, but still it’s not realistic, you need to try it on your skin in order to have a better feeling.”
10:0min
“How can you imagine people puts make up in this way? This is crazy. Now I understand why at the beginning you couldn’t understand it was L’Oréal.”
End

Interview

Question 1: Please describe your experience with the app.
Overall I didn’t like it I’m really into make ups, and I think that trying them it’s a fundamental step in order to purchase them. The app wasn’t realistic at all. It offered few products, colours were fake and it wasn’t even easy to navigate it.

Question 2: What is the first word that comes to mind when you think of your experience?
Clown

Question 3: What did you like/ dislike about the app?
What I didn’t like is that the cosmetics are not realistic, not very precise. With this kind of apps, you already know that they don’t work properly. I didn’t like anything, it was hard to navigate around and understand where to go and where to click without going back to the main menu.

Comments during conversation

- You don’t even understand that this app is from L’Oréal.
- I really don’t like the gloss. What does intensity mean when you put make up on. It doesn’t really make sense. Is it referring to how many times you put make up on for example? It’s not realistic. What does gloss intensity mean?
- For the Eyeliner, think that there are different ways you can put it. Here it just gives you one way. Then I mean it understands perfectly where your eyes are and that is nice.
- The blush does not seem real at all or it can work if you want to be a drug queen.
- I saw better apps that put make up on, but they were using pictures.
- Think of the lipstick. Not all colours match my skin, and the ones in the app where clearly fake.
- I’m skeptical. It’s hard that you buy a product after using this tool. You can just play with it, but it’s not realistic.
- Lets try with the mascara. I wouldn’t buy it only after using this tool. I buy mascara based on the brush, cause I know which type of brush works with my eyelashes. Here i just see the effect, I play with it, but I’m very skeptical.
- Also look at the eyeliners, they already prepared a shape for you, but people use eyeliners in different ways, how can you imagine I will put it this way? This doesn’t make me want to purchase it.
- I would never download this app. If I have to shop cosmetic products, I want to go in a store so that I can try it on my skin, touch it.
- Eyeliner you want to see how it writes and you try it on the hand. And the way it draws makes you want to buy it or not. So the app is not realistic and it’s not enough to make you want to purchase a product

3.1.5: L5

Name: L5
Gender: Female
Nationality: Italian
Age: 24
Other demographics: Student

Observation

Location: University
Lighting: Bright Lightening
Overall Impression: The interviewee was playing around with the products/colours/Intensity.
She started with the eyes, was surprised and happy about the effect. She was having fun and curious in trying different products. She tried make up on all the parts of the face. No more then a couple of products for part. And then the pool of products. She laughs when trying the pool of the products, to intense, not realistic. She showed also perplexity in navigating the app, as she was annoyed that it constantly was going back.

0:30min
Goes through the app and scans her face. Pulls the phone closer and further for it to recognize it.
0:52min
“Nice there are different products.”
Goes to the eye section.
“So I put mascara here. Nice”
The app asks again to scan.
“Oh my God, what happened? It’s scans every time I update?”
1:35min
Moves to the Lip section.
“Let's try with the Lips. It’s very good it recognizes my face. But it crashes when i want to change the intensity or colour.”
The app constantly asks her to scan the face.
2:00min
“Uhm… It scans my face every now and then, and is not easy to go back.”
2:35min
Starts from the beginning. “Let's start again from the beginning.
Moves to the lipstick section. Pulls faces.
“Lipstick colours are too strong.”
3:00min
“The part where you chose the products is very well done.”
The app asks her to scan again the face.
“It scans again! It has some problems here”. Starting to get annoyed.
3:33min
Dives into the product info section and looks at info and filters.
“I can filter products for style and colour, nice”.
3:46min
Goes to the lipstick section, scrolls up and down and then choose a product
“Let’s try this gloss colour….Awwwww, ahahah, interesting colour here. I think it’s too much.”
4:15min
After trying all the cosmetic sections, moves to the looks.
“Lets try this rebel style…. Ahahah I really don’t like. I think it was better when I chose my own products.”
4:30min
Goes back to the filter and information section.
“If they use filters they should definitely add more product, otherwise it doesn’t make sense”.
5:00min
Looks where to conclude the shopping experience and changes her selection.
She searches around without success.
“How do I understand where is my shopping bag? ‘Cause I Would like to eliminate products, it’s not clear. Personally I would look for a bin for example. “
5:30min
Taps in the middle.
“So here I can share my pictures and put filters on it. Interesting.”
Scrolls through the different filters and download the picture.
5:45min
End

Interview

Question 1: Please describe your experience with the app.
Overall it's an interesting and entertaining experience. It's a fun app to play with and try on different products. However not completely realistic and easy to navigate.

Question 2: What is the first word that comes to mind when you think of your experience?
Sophisticated and unreal.

Question 3: What did you like/ dislike about the app?
It's impressive the technology that it can recognise my face, lips and eyes. It makes it more real. What I don't like: I like to feel a product on my face and try it on and this is missing with the app experience.

Comments during conversation

- It's very good cause it recognises my face. But it crashes, it always asks me to scan. It's annoying. And also if I want to go back it's not that simple and clear.
- The part where you can chose the products and respective information is well done. I like the filter structure. However I would personally add more products, as it doesn't make much sense to have filters with such few products.
- Every time I want to change intensity it crashes and goes back.
- It's not clear how to go to the shopping cart and eliminate products. For example I would look at a shopping bin not an arrow.

3.1.6: L6

Name: L6
Gender: Female
Nationality: Danish
Age: 26
Other demographics: Asian-looking, does not frequently use make-up

Observation

Location: University
Lighting: Bright lighting
Overall impression: tried a lot of different products, was very interactive with the app, pulling a lot of faces, enjoyed herself
Found intensity function: no

0:15min
"So it's only a makeup app? Because there is also a blogger?" [Explanation]
"Ah, so you can try the stuff. Makes sense"
Goes into latest product
Still looking for AR function, just clicking through page
"This is products, so not here - I'm going to go back"
[Explanation from interviewer] "Oh!" sounding surprised, pulling face, smiling
"The more you learn"
[Interviewer: The whole app is AR] "Oh! That is cool!"
0:57min
Tries on first product
"Ohhh!" sound of understanding
Straightens phone and makes her face long, opens eyes wide then squints
Starts laughing "That was me"
Smiles, "Oh this is cool"
1:12min
Tries to find a different colour
"I want to try to find a brown one, because that is what I need to test anyway"
Scrolls through products
Scans her face
Finds brown ones - "Yes! They have brownish ones"
Tries on "No that's not the colour"

“Oh this is cool! [smiles] I’m having fun!”
1:40min
Pulls a face, mouth in wide grimace
Moves mouth in weird shapes
1:47min
“I think I have tried something like this … two years ago. [keeps pulling faces] which did not work at all. So this is kind of funny” moves her mouth around in grimaces; tries different colours
“It colours my teeth too, but not that much” pulls her lips back
2:06min
After having tried different colours “Ok, so we stick to that one”
Scrolls through products “And then we add …”
Enters looks part of app
“Oh! [sounds surprised].. What is this? Ohhh! [sounding pleased] you have looks”
Smiles
2:25min
“So she is Asian, so I’ll try that”, chooses look
Pulls her hair back, opens her eyes widely
Looks sceptical “Yeah. Not gonna do that”
“But it’s fun”
2:40min
Moves her face slightly
“How do I go back to what it … [smiles] Ok, I went out of the app”
Re-enters it
“I need to clear this thing.. How do I..” frowns
3:00min
“I took a picture.. That’s not how you clear. Delete!”
Resets app “Ok, we’re back”
Tries different options, repeatedly saying “no”
“I looked at lipsticks before, and now i finally reset it so now I am just looking at what else I can find in here”
3:29min
Tries on blush
Holds her face still “Yeah! They do not add blush where I usually add blush.” frowny-smiles
“It is kind of funny to see myself extremely pink which would not ever happen, because I would look like a character from a cartoon”
Opens eyes wide
4:05min
“Eyeshadow, what can you do?”
“Oh, this is fun!” Moves head up and down
“They add makeup for a different type of eye than I have” keeps moving head up and down
“Which is .. it looks fine, I just ..”
“They add makeup here” [points to her upper eyelid] “Where I don’t put makeup - far up, because it looks funny. But fair enough”
“I can still see what it sort of would be”
4:40min
Turns head to pull hair out of eye “Oh! [surprise] It goes away if I turn my head!”
Turns head repeatedly
“Actually it is still on this eye [points to eye closer to camera] and then it just goes out [points away from her face]”
Moves head up and down
4:55min
Looks at different products
chooses one, slightly moves her head “Oh” [sounding intrigued]
Clicking on app
5:05min
“It’s a fun way to test colours and stuff”
Moves her head “Now I look like a lion”
5:22min
“I think I have been testing a lot of stuff” laughs
Tries one more look “What can she do?”
Moves head up and down, pulling faces
“I’m making faces” starts laughing
“It’s fun to see what it does cause it’s .. how it puts on stuff”
5:55min
End
Interview

Question 1: Can you describe your experience?
It was fun. Mainly playing around. It's a bit confusing in terms of … like when I want to go back to a blank slate, or what I'm saving and where it's saving it to… I think it is a cool way to try products, if you don't want to go to a store… and this would also assume that it puts it on as it should be and you're not limited to your own abilities [laughs] .. in a way, seeing as it is the standard way in which they put it on, which makes sense. But it's just for stuff like eyes, it's very .. depending on your shape of the eye depending on how you put on eyeshadows for instance. But it's cool.

Question 2: If you have to describe the experience in on word?
Interesting? [laughs] It's just, I've never … had it being interactive like this. In that way it is interesting. That's also why I kept making faces, because I wanted to know, how much can it follow? How much can I mess with it? .. which was quite a lot. If you look straight at it.

Question 3: What did you like the most, and what did you dislike the most?
I liked the lipstick thing a lot. If we're just talking the different things you put on. The blush thing looked very, very fake… so.. But it's mainly that I found it a bit confusing to actually clear it. I think that is what I disliked the most. It's not as intuitive as I would like it to be. And the blush just looked fake, for me. As soon as it was anything other than skin colour.

Comments during conversation

- It's a limited range of products. And I usually mix brands, I prefer some for different stuff. But it's cool.
- She is unlikely to buy makeup, because of the brand

3.1.7: L7

Name: L7
Gender: Female
Nationality: German
Age: 24
Other demographics: Redhead, very light skin; teacher; uses make-up very heavily

Observation

Location: her living room
Lighting: darker lighting, but natural, light in the back of the test person
Overall impression: No pulling of faces, very analytical, a lot of laughter about the extremeness of the app, mainly focused on looks, only put up phone when using AR function
Found intensity regulation: no

1:00min
"Very interesting until now. [laughs] I'll just start at the top"
"Even though I don't know yet what is what"
Enters blogger look function, scrolls through look, sighs a bit annoyed
[Explanation of interviewer about try it function]
1:28min
Tries it, puts the phone up to her face
"Wow. [sounding surprised] Pretty lipstick" [sounds ironic]
Smile on her face "Oh my God. That does not look at all .. it looks really extreme"
"Oh. That looks really creepy" laughs
"Interesting [sounding sceptical], but it does work well that they find lips and eyes, which I am impressed with"
Lowers phone back down
"But now I first need to find how I can change the makeup"
"Or is it only the one look that she is wearing at this point?"
"And you can find the products for it beneath"
"Ahh! Ok! It is a very interesting app, but…"
2:19min
Chooses new look, raises phone back up to her face
"None of these looks looks good on me" laughs
"Ok. Rad. Now I am using the pink power. It is not my colour, but it is surprisingly good"
"Now that you know what this is for, it is quite manageable. Because you have the products right below, which she is wearing"
2:49min

“Are there more than just those three looks?”
Explores function
“Ah! Here I can vary stuff”
Raises phone back up
“Ok. This is funny”
“Oh, and you can save the looks if you want”
3:13min
Finds lipstick function
Laughs
“It is interesting how well it works”
Laughs again “That looks really funny”
“No, I don’t want to save this picture. Because honestly it looks very much like a clown”
3:33min
Scrolls through app, enters product function
“Ok, so here is only lipsticks? Oh, no there is also mascara, and down there blush”
“Can I only buy the products here, or can I try them on”
Tries one, raises phone to head level again
“Rad. Oh, they are fake lashes, right? - Interesting” smiles
“Ok. so you can order all products right away, if you like them”
4:25min
“But it is only by L’oreal? So I can only buy L’Oreal products?”
Scrolls through app “Ah! Here are a lot of looks, so those were just the home looks before”
“Let’s try a natural look” laughs
“It’s fun to try out” raises phone to her face
4:49min
“But now something is wrong. It doesn’t find my face now”, moves phone slightly
“Now!”
“Very dark eyebrows for a natural look”
“But still cool, it is definitely better than other makeup apps, especially because it is with the moving face. Usually it takes a picture and then makeup is applied to the picture” scrolls through app
5:20min
Raises phone up again
“The colours are very intensive. Especially the eyeshadow”
“And it doesn’t look 100% natural of course”
Tries one look with eyeliner
Laughs, “It does look creepy” moves phone closer to face
Turns her head, moves phone farther away
5:55min
“The idea is cool! But I think it needs to be improved. It does not look really realistic”
“It is better than others, but still”
6:17min
“The lips are made well, but the eyes are extremely too much makeup”
“This looks quite cool” moves phone back and forth
“It just puts the makeup over my own makeup”
6:52min
“Here are nude tones” starts laughing
“But .. with the natural stuff, you do not look at all natural”
“Here for example the blush is so extreme, that .. just look at how my cheeks”
“Bright orange makeup”
7:09min
“On the picture it looks quite cool”
“I also think it is nice that you can find the products instantly when you like the colour”
“But on yourself, when you press the try it button, it doesn’t look like that”
“Then it always looks extreme, but on her it looks good, but on yourself it is too extreme”
Raises phone back up to her face, “With her it look as if she isn’t wearing any, but with me it looks as if I .. [laughter in voice] .. look. This is her, and this is me”
“It is completely different”
“Otherwise you can see the products nicely on the women, and then it is super easy to buy them, as long as you won’t end up looking like on these videos” laughs
8:00min
End

Interview

Question 1: Please describe your experience with the app.
Very nice overview, once you get familiar with it. At second glance definitely very neat .. otherwise a good idea, but I found the realisation of trying on the makeup not yet quite successful. Better than with other apps, but still difficult, because it looks like too much makeup.. too extreme and to unnatural.
Sehr übersichtlich, wenn man sich eingearbeitet hat. Also auf den zweiten Blick auf jeden Fall sehr ordentlich .. ansonsten ne gute Idee, aber die Umsetzung fand ich noch nicht ganz gelungen mit dem Makeup ausprobieren. Besser als bei anderen Apps, aber trotzdem schwierig, weil es einfach zu überschminkt ausschaut.. Zu extrem und zu unnatürlich

Question 2: What is the first word that comes to mind when thinking of your experience?
.. that is difficult .. it is not … it is not really innovative, because something like this already exists, and I believe they could .. it is definitely needs to be improved, but it is also good. So I wouldn't take that as a word - needs to be improved, because it would be a pity, because the app is also cool. Cool is a good word.

… das ist schwer .. es ist nicht so .. es ist nicht so richtig innovativ, weil es so was in der art schon gibt, und ich finde sie könnten es noch .. also verbesserungswürdig ist es auf jeden fall, aber es ist auch gut. Also würde ich das jetzt nicht als wort nehmen - verbesserungswürdig, weil es eigentlich schade wäre, weil die app an sich ist schon cool.
Cool ist ein gute wort.

Question 3: What did you really like and what did you really dislike about the app?
Yes, about what I already said. I liked that it was neat and clear to use, that you could find the products you liked instantly, and what products they are, that you can look at pictures of different people wearing different styles. I didn't like too much that it doesn't look natural. But I like that the eyes and mouth are recognized very well and also that the face is recognized pretty well, which looks more realistic than with other apps. But … and there are relatively few looks, I think it was seven or eight different ones, that were already put together. Of course, you can try endlessly many yourself, which I didn't do.

Ja, ungefähr das was ich bereits gesagt habe - ich mag dass es ordentlich und übersichtlich ist, dass man die produkte, wenn sie einem gefallen auch sofort findet, was für welche das sind, dass man sich fotos von verschiedenen leuten in verschiedenen stilrichtungen anschauen kann. Ich mag nicht ganz, dass es nicht sehr natürlich ausschaut. Ich mag aber dass die augen und der mund sehr gut erkannt werden und auch das gesicht ziemlich gut irgendwie erfasst wird, was realistischer ausschaut als bei anderen apps. Aber .. und es sind noch relativ wenige looks, es waren jetzt glaube ich sieben oder acht verschiedene, die schon vorgefertigt waren. Man kann dann natürlich noch unendlich viele selber ausprobieren, was ich jetzt nicht gemacht habe.

Question 4: Would this app help you make a purchase decision?
I don't really think so. Maybe as inspiration, but .. and maybe rather for people who don't .. use make up at all. But if you do … and I do. I use makeup pretty much always, and always rather similarly, and I think if you are a bit set in your ways , then you don't get new experiences out of the app. But if you don't do that and you want to see which type you are, or which colour suits you, then yes.

Ich glaube eher nicht. Also vielleicht als inspiration, aber .. und vielleicht auch eher für leute die sich nicht … also überhaupt nicht schminken. Aber wenn man selber sich.. Und das mach ich. Ich schmink mich eigentlich immer, und auch immer ziemlich ähnlich, und ich glaub wenn man da so ein bisschen festgefahren ist, dann holt man sich nicht unbedingt so neue erfahrungen aus der app. Wenn man allerdings irgendwie das gar nicht macht und schauen möchte was für ein typ man ist, oder welche farbe einem stehen könnte, dann schon.

Comments during conversation

- I can't imagine the app for me, but maybe for others
- The only thing I didn't find that ideal, was the interaction with the app, even though it is a cool function.
- I found especially the colours extreme, I looked like a clown. I don't know it it's like that with other people as well.. Or if it was because of the light? I had the sun in my back.
- I don't think I would scan the products in the shop to see how it would look on me. I'd rather look at pictures of other people how they put it on, but scanning as such I could see that, yes. A lot of people do it with other apps. I just wouldn't try it on myself.

3.1.8: L8

Name: L8
Gender: Male
Nationality: German
Age: 24
Other demographics: Goth/punk style; uses makeup every now and then, teacher; gamer

Observation

Location: His room
Lighting: natural light, not too bright, but not too dark either
Overall impression: Very sceptical, a lot of laughter at looks, did not pull faces too much. Only in the beginning, combined products to a look, actually spent some time reading about products
Found intensity function: yes

0:24min
First looks at home page
Smiles, laughs " I have no clue what I can do with this"
[explanation of interviewer]
0:58min
Tries on lipstick
Pulls a kissy mouth
Smiles, "It doesn't work. Oh no, it does. My lips are colourful"
Raises phone to head level
Makes faces "But it doesn't work … that looks stupid"
"Maybe it doesn't recognize my lips"
Smiles, lowers phone
1:21min
Tries a new product
"I don't think that looks good on me" laughs
Smiles, while trying out the app
1:44min
"I don't know what I am doing here"
Raises phone higher to face
Starts laughing - "That looks so stupid"
2:12min
"Ok, now add mascara"
"I choose brown .. hmm .. that is not brown"
Moves his hair out of his face, chuckles
Moves phone a bit
2:39min
"What else can I add?", adds blush
Smiles "Pretty, pretty, pretty" [irony] laughing
Keeps laughing "I should always run around like this, don't you think so?"
Tries to clear the look
Chooses a new look "that looks really crappy"
3:11min
Moves his hair more into his face
"When I have hair over my eye, it applies makeup to my hair" laughs
Tries several looks
3:35min
"Let's see what looks good on me"
"Yeah, this looks quite good. It looks as if I scalded myself" smiles
"But then the lipstick doesn't fit anymore"
3:54min
"Why can I only choose so few products?"
"Are these products they want to really sell?"
4:09min
"Now it doesn't work again", sighs
4:26min
"I want to save my look."
"I need to log-in? No"
Studies app further "Well that looks quite nicely" chuckles
5:02min

End

Interview

Question 1: Can you describe your experience with the app?
I found the app to be rather confusing [laughs]. So, I did not know what the icons meant, but once that got clear … I don't know. The menu navigation was somehow a bit strange. But otherwise … Yeah, they [laughs] put makeup on you. That did work quite well, apart from when my hair was hanging over my face or when … it didn't understand at first glance where the mouth was and then makeup was applied onto something else. But otherwise it did work quite well. Yeah, it's also quite fun, but .. it is not something spectacular [laughs]. I think, if … Isa or someone can probably use it quite well to see something different, but actually it would be more fun to just put the makeup on yourself, and only then you see it properly, I think.

Ich fand die App eher unübersichtlich. [laughs] Also, ich wusste nicht was die Icons bedeuten, aber wenn man es dann mal aufgedeckt hat.. Keine Ahnung. Die Menu-führung war irgendwie ein bisschen seltsam. Aber ansonsten.. Ja, hat man [laughs] wurde man irgendwie geschminkt. Das hat schon recht gut funktioniert, bis auf das dass wenn die Haare im Gesicht waren oder man .. der hier das erste Mal nicht gecheckt hat wo der Mund ist und dann irgendwas anderes geschminkt hat. Aber sonst. Hat es ja ganz gut funktioniert. Ja, es ist ja auch ganz lustig, aber .. es ist jetzt auch nichts spektakuläres. [laughs] Ich denke, wenn irgendwie die Isa oder so kann sowas ganz gut nutzen, um mal was anderes zu sehen, aber eigentlich wäre es doch viel lustiger einfach mal das selbst dann drauf zuschminken und dann sieht man es erst richtig, glaube ich.

Question 2: If you think of the experience, what is the first word that comes to mind?
… amusing? Because, I don't know, you can try on makeup and try stuff out, but ...

… amüsant? Weil, keine Ahnung, man sich da halt schminken kann und irgendwas ausprobieren kann, aber …

Question 3: What did you like the most and what did you dislike the most?
I did not really like anything that much, but … I didn't like that you didn't understand at first glance how it works.

Mir hat da jetzt eigentlich nicht so wirklich was krass gefallen, aber … I didn't like that you didn't understand at first glance how it works.

Question 4: Did you find anything surprising?
No.

Question 5: Would the app help make a purchase decision?
Yes, if there were more possibilities. There were only very specific sets of colours, and there should be more adjustment options, in which colours you do what. For example, the blush, that looked completely horrible. Nobody would put their makeup on like that. [laughs]

Yes, if there were more possibilities. Es gab ja immer nur ganz spezifische sets von farben, und es müsste noch mehr einstell-möglichkeiten geben in welchen farben man was macht. Zum Beispiel dieser Rouch da, das sah ja total schlimm aus. Niemand würde sich so schminken. [laughs]

Comments during conversation
-

3.1.9: L9

Name: L9
Gender: Female
Nationality: German
Age: 25
Other demographics: Industrial designer, caucasian, doesn't use makeup frequently; used it with glasses; had a design project for AR

Observation

Location: Her living room
Lighting: bright, natural lighting

Overall impression: She was very focused on the app while looking at it, she did pull faces, but not too much, other than laughter and some exclamations she did not show too many reactions
Found intensity function: yes

0:10min
Starts with top function (blogger)
Scrolls down the whole page, before trying it on “Because I always do that first, because then I can see what is on the page, before I press some buttons. Like try-it”
0:55min
Tries on look
Laughs “Another video. Great”
Looks closer at it “Ah. Tap your face..” Does that
Makeup is applied, a second of nothing, “Whoa!” starts laughing
“I never tried that before, so it is funny”
Pushes buttons on app
1:30min
“Ah! Mascara. 4d.”
“You can’t change the colour” (still in blogger look)
1:49min
Moves her glasses up, away from her eyes and then back down; repeats several times
“I’m just checking if it changes if I take of my glasses, but it doesn’t”
2:00min
Finds intensity regulation
“Intensity.. Ah! Ok, because it is a lot too much” adjusts
“Add to basket.. Can I buy something?”
Scrolls further
“Ahhh! [sound of realization]”
2:38min
Looks at different eyeshadows
Chooses one, adjusts intensity “It’s too much!”
3:00min
“Ahhh! I found some colours”, presses one
“Whoa!” starts laughing happily
Presses a button “Hey! [indignant] it disappeared..”
Scrolls further through the app
3:30min
“Wow! They have a lot of colours. And some look really crazy”
“Now I am trying all the colours”
Takes her time to look at colours
4:00min
“And now I am in the lipstick option, and I will try all the colours again” chuckles
Scrolls through app
4:19min
Pulls a face, opens mouth wide
“Ahh! It even works when I open my mouth! That is good”
“But I think they don’t have my colour.”
Scrolls through app
4:50min
“Ahh! Try a look. Spring spirit..”
“Do you want to override your custom look? Override!)
Adjusts her glasses
Scrolls around
5:25min
“Now I am trying blush, but that looks horrible”
Pulls a face, opens her eyes excessively “Woah!”
Goes back to looking at options
5:50min
“I don’t really get the difference between the looks”
“I will try Peal passion” pulls a face, adjusts glasses
“Maybe it looks a bit different”
6:30min
Tries a new look
“Natural nude.. That is different. That looks better”
Short pause

“Maybe not” [laughter in voice]
Pulls a face
Chooses new options
“Hmm”
7:09min
“I’m trying lipsticks again, but I am not very happy with the lipstick option”
Laughs “it is too much.. Or maybe it’s just me, because I normally don’t use it”
“Or maybe I should not have the highest intensity .. then..it might be better”
Keeps clicking on phone
“Ok. Ups”
8:02min
“Ah! Ok, I just found some photos”, laughs
“Or no.. what is it doing? I don’t know. Different things..in Different colours”
“Maybe it is a filter. I think it is a filter. Yes, must be a filter” keeps clicking
8:35min
“I’m back on the home page”
“Latest look - pink power” tries that
“Oh! [sounds critical]” adjusts settings
9:04min
“Lipgloss!”
“Aha! No doesn’t make it better”
Starts laughing, showing the image to the interviewer
9:24min
End

Interview

Question 1: Please describe your experience.
Funny. In the beginning interesting. Then a bit frustrating. [laughs] Why frustrating? Because I couldn’t really see the difference between the [chuckles] different look options. So it was always the same with the lipstick again. It always looked horrible… and .. maybe a bit .. maybe .. well, if you use it more times, it is probably easier, but .. you don’t really have an overview.

Question 2: If you have to describe it in one word, what would that be?
Funny. Because it is like carnival I think. [laughs] at least for me.

Question 3: What did you like the most and what did you dislike the most?
Best thing is that you can change the colours [laughs]. And I didn’t like that I couldn’t see my whole face.

Question 4: Would it help you make a decision?
No, because I think it is wrong. What I can see, what they project on my face is not what the colour would really look like, because the colour will look different on my skin. So I think it is a lie. [laughs] basically. Because they just put a colour on top of a photo, but if the real colour touches my skin, it will look different. Or that is at least what I think.

Comments during conversation

Comment on design of the app: “If I look at things at the bottom, e.g. adjusting the colour, then I only see the top half of my face. Which is a bit annoying. And if I would hold the phone in a way that I would see my whole face, I can’t see the adjustments any more, at least not properly.”

But they don’t tell me how to apply the makeup. So even if I buy these products for the look, I wouldn’t know how to apply them and then it would look strange.

I would like to try that. If it actually does look different when you apply it to your skin.

The experience was funny (“witzig”)

I don’t think I would buy the brand, just because the app is from the brand. Or at least I don’t think so.

I don’t know if it would help me make a decision, if the technology was better. Normally I go into the shop paint it onto my hand and then I see it. I look like a parrot after, but.. I don’t think I would

I rather felt like the app did what it wanted with me - definitely not empowered. (interaction part)

It didn't help my understanding of the product. I know what product it is, but I don't know what it does. They didn't explain to me how I would use it.

I am wearing glasses. If you are wearing glasses, you have to put on makeup differently than without. And they did not take that into consideration. If I would put on makeup as extreme as they did and wore my glasses over it, it would look horrible, even more than without, because it looks even more extreme.

I did feel immersed, after all I saw it on me all the time.

Useful information: I do know now, that I should not wear super pink lipstick, because it does not look good on me.

After: she tried IKEA
I think you would have to project it as a hologram into the room. As long as it stays in the smartphone, it is not that different from using a picture. You still look up and down, and don't really know how it would like like. You still need your imagination.

3.1.10: L10

Name: L10
Gender: Female
Nationality: German
Age: 25
Other demographics: Business student, uses a lot of make-up; parents own a cosmetics store, and has worked in cosmetics before

Observation

Location: Her living room; used it without having makeup on
Lighting: bright, natural lighting
Overall impression:
Found intensity function: yes

1:00min
"At first glance I find it appealing, simply from the colour scheme"
"With red, and I do think the two girls look good. I do like the upper one, better than the lower one. She looks more happy and open."
"Not like a classical model"
1:45min
Enters blogger function
Picks up phone, and enters try it function
"Aha! Yes! [smiles] that is good!"
Taps her face to start
"Is something happening already?" shows the interviewer
Interviewer: There should be makeup applied to your face
"Yes, I do believe I look like I am wearing makeup"
2:20min
Starts to explore functions below her image
Accidentally leaves app
Re-enters app
2:45min
"Alright that is good! So here I can change things"
"The eyes" ..
"Let's try blue mascara. That always looks good"
3:05min
Moves head slightly up and down
"Oh.. and now I can change the intensity.." "Aha!"
"That does look good now"
3:21min
Scrolls through
"Let me take…" inspects her face "Maybe …" chooses blush
"Oh no!" Look at how that looks!" shows interviewer, sounding shocked

“Oh my god. That does not work”
Changes colour “This is much better. This pink”
Moves head slightly
“That does look quite dashing. .. but then the lipstick doesn’t work anymore”
“But that doesn’t matter. We can take this brown, and then choose a different lipstick which fits”
4:10min
Enters lipstick, chooses one
“Oh my god. Look at how I look!” shows interviewer
“That does not work!”
4:30min
“But here, a more..” moves her head, scowls, chooses different colour
Moves her head, looking skeptical “I had the feeling that the blush is looking pink, even though I chose the brown one. I took the brown blush, and it did look brown at first, but now it looks pink. It looks strange”
4:45min
“I’ll go back and see if it is still brown. That was.. Ah, here.. No! [sounding indignant] It isn’t. Why?”
“It’s back at pink”
Tries to re-set, moves head slightly
“Ah, now! Now I look good, I think.” pulls kissy mouth
5:28min
“Then let’s continue with my eyes”
“But I want to do style” reads through options
“Let’s take ‘maga volume’”, chooses options
“Aha!” moves head slightly “I do like this”
6:10min
Scrolls through app “When I press this … Now I have one, two, three.. different things at the bottom.. Different Pictures?” shows interviewer “Are those filters?”
“I don’t need that”
6:38min
Presses something “Ups! I don’t want to share this on facebook” smiles
6:45min
“Save your look… No I don’t need that”
7:00min
“Alright, so now I tried Simone’s look, now I’ll look at latest products”
“Favourites… Login required? Do I need that?” *No*
Chooses a product
Moves her head and the phone
“Aha. First of, I think … [chuckles] that is not .. oh, now it’s working”
7:25min
Raises phone to better inspect her face
“I think in general it is fun, and it does look good now, maybe here”
“But if it will really look like this .. I doubt it. It does suit me, but if I now buy this strange purple lipstick, if it will really look this good .. I doubt it. I must say it does look good. You can also try good looks”
8:15min
Taps on app “Do you want to save your look? .. Delete”
“Here is a new look.” moves her face slowly
“It looks … This lipstick does not work at all … [tries a gloss] ..”
“It does look good now, but if … I mean I put on makeup every day, but that my eyes look like this … that happens very rarely, that’s why I think it will be unlikely that will actually look like this … if I buy all of this”
8:51min
Raises phone up “I don’t know”
“But I do think it is really well made”
Tries products
9:15min
Tries eyeshadow
“But I first need to apply it exactly like this …” moves head “that is my problem”
“And if I take some filters, then it might look good here, but the problem is that will not be like I actually look like”
“I am pretty skeptical. It might be cool and you can probably try stuff, but in the end if the lipstick in combination with the blush will look like this on me .. I don’t know”
10:00min
Turns her head, “and what I find now … I don’t know if I didn’t do that yet, but I do need a foundation”
“Because that is something that bothers me now with my face. Because if I would do it myself now, I would do that now. And it does make ..”
“Honestly, this look… I look like a hooker on the street” shows interviewer
“Maybe it’s because of my hair, but something like this.. That does not work at all”

10:35min
"But I would need a foundation"
"How would it work if I had makeup on right now?" *Explanation interviewer* "Ah! Ok!"
11:05min
"What else can I do here?"
Scrolls through app
Tries eyeshadow "Now it gets even better" [irony] starts chuckling, then laughing
Shows interviewer "I won't take this! But I do think it is also because of the lipstick"
11:53min
"And I could buy all of this here?"
Explores app further
"This latest look … is not the hit"
"I like the one from the blogger, you could go on the street like this"
12:35min
"But you do need concealer and foundation in the app"
Moves phone closer to face "I would find that important"
12:58min
"What can I do here?" "Oh! There are a lot more looks here"
Raises phone up to face
Moves hair out of the face
Tries a new look
"It all looks good. But I have used mascara often by now, and it never looks like this. And it will also never look like this with me, also not if I buy it. I know that 180%. Unless this is fake lashes.. But it will not look like this with me"
Tries natural nude "I do like this look" moves face and mouth "This looks good"
14:35min
"I find it useful to go into the store and try it. And I think that will be better than this, even though I am really impressed with how well it applies it to my face"
"It could potentially work for lipstick. It is most likely that it will actually look like this"
"If you already know the brand and know the consistency. It looks very matt, so either it will be more shiny when you actually apply it, or it will be this matt, but then it won't look like this, because it is more dry and it will enter the small folds of your lips more"
"It won't look like this in the end. I am a bit skeptical"
15:40min
End

Interview

Question 1: Please describe your experience.
It was a quite good experience, because it was .. a new one. I haven't used the app before … So I'm actually quite impressed with how well it worked. .. yeah, but I personally think that I wouldn't use it to actually buy makeup, because I like to go to the store and see the products and maybe try them out over there, because I am a bit skeptical that it will actually look as it is here. But I mean it was fun and .. as I said before maybe it works for certain products, for example lipsticks or lipglosses very well, but for other.. For eyeshadow, for example, I'm a bit skeptical, because it's also important that you know how to put it on. But it was actually quite fun to do it.

Question 2: If you have to describe the experience in just one word, what would that be?
Innovative… because it is something new. I have never seen that in the cosmetic industry before and I am quite familiar with that industry. So I think it is a new thing … what I actually really liked.

Question 3: What did you like the most, and what did you dislike the most?
I liked the most the technical aspects, that it really put the makeup on the parts of my face where it really belongs. I mean, I was really impressed by that. .. and I disliked .. the most that there is no foundation, so I actually think it is not a complete makeup, eventually.

Comments during conversation

3.2. IKEA

3.2.1: I1

Name: I1
Gender: Male
Nationality: Italian
Age: 22
Other demographics: Business Student & Intern

Observation

Location: Office
Lighting: Natural Lighting
Overall impression: The interviewee was surprised and liked to play around with the app. He really had a lot of fun trying different pieces of furniture. At the beginning the playful aspect prevail, particularly in trying to put furniture in funny places, like a bed or a bench on the table instead of the floor. After playing with it for a while, he tried to put product in a realistic position. The interview was really immersed.

0.30min
Scrolls through the app. He is surprised at first.
Chooses at first to put a chair on the table
1.00min
Moves the phone back and forth.
He positions the products, taping the screen to change the dimension.
“Look at this, it’s so cool”
1,36min
He tries different products. Turning on his chair and playing
“It’s so funny”. He turns around the chair trying pieces of furniture
2.30min
“Wow! Look at this.” He put a sofa on the table in front of him
Shares the phone with me, showing me what he found.
3.00min
He scrolls through the different product, and takes time in deciding which to try.
He gets more and more into the app. Smiling at the different features he finds out.
3.30min
Explores the space with the phone.
Looks at whether the objects really move or not.
He wants to try the lamp, but he can’t find it. “Why is there no lamp if I click on the tab?”
4.00min
He stops for a while on the bed section and observe the different products.
“There is a mismatch between the icon shown here and what is augmented.
Why can’t I see the pillow and the mattresses for example?”
4.25min
With this focus he tries other beds. He’s surprised that the image on the tab doesn’t match with the digital figure.
5.00min
“Can I stand up?” he turns around with the phone and tries furniture
Stands up from the chair. And points the phone with different angles. Makes surprised and happy faces.
5.45min
The interviewee moves the phone closer and further from his eyes to better position the products.
6.30min
End

Interview

Question 1: Please describe your experience with the app.
It’s funny. It’s like a game. Usually buying furniture might be boring, but through this app it makes it funny.

Question 2: What is the first word that comes to mind when you think of your experience?
Funny. I didn’t feel annoyed or bored.

Question 3: What did you like/ dislike about the app?

I didn't like I couldn't see the lamp options, and they were a tab in the app. And I liked I could see furniture placed in the space. it could be useful if I want to buy a wardrobe and see it in my room before going to Ikea and buy it.

Comments during conversation

- I wasn't satisfied with the quality of the app. As it doesn't look real as it's supposed to be. As you saw before the bed doesn't stick on the floor properly and couldn't turn it around as I wanted. Maybe they should work on it.
- They should add more furniture, too few.
- The pictures of the furniture should resemble the product portrayed. For example if a bed is showed with the mattress, why don't I see the mattress?
- Regarding valuable information, I didn't know the length or the weight of the product. Just seeing the product in the space is not enough
- The app can improve your customer experience, your engagement, but I don't know if it would make me purchase more.

3.2.2: I2

Name: I2
Gender: Female
Nationality: Italian
Age: 27
Other demographics: Business Student & Intern

Observation

Location: Office
Lighting: Natural Lighting
Overall impression: The interviewee was focus and concentrate in placing the product around the space. Fun and playful drivers emerged in her actions and you could observe them on her face as well. It was fun for her to put products in unrealistic places. She was immersed and she tried as many products as she could.

0.45min
Start looking at the different features and understanding how the app works
1.51min
Choses at first a wardrobe and laughs as she put it on the table
She moves the phone close and far away to have a better understanding of the dimensions
"Ok, I like this, looks good".
2.41min
Tries to choose two different products to allocate in the space
"How can I put two product at the same time? Once I choose one the other disappears?
She's surprised and goes ahead trying to tap more products.
3.20min
"I can put just one product at the time? It's cool, but you loose the overall vision of the space."
Change of product and tries a small bin
4.15min
Choses a chair and places it realistically in the space. It makes it bigger or smaller depending on how far it is from her
She's having fun and smiling.
4.20min
Moves to the sofa section
"Aww, this is interesting. It's three sofas! It's so big"
"It's shows it to you if you open it completely."
"They exit from here and come back from the other side"
5.40min
Moves the phone around, tapping the screen to reposition the object.
"It's stay where you put it"
5.57min
"Lets try another one."
Scrolls among the products until she choses a bin
6.36min

Plays around with the bin, putting it in not realistic positions and making it bigger or smaller until she is satisfied with the outcome.
7.20min
End

Interview

Question 1: Please describe your experience with the app.
It's a nice experience. However you can put just one object in the space and not more. It's awesome because you can picture the furniture in reality and not just in your mind, it's actually useful.

Question 2: What is the first word that comes to mind when you think of your experience?
When I think at the app I think of "Home". Also because my apartment is all Ikea, so it's easy.

Question 3: What did you like/ dislike about the app?
The thing I liked the most is that you can understand how it looks in reality. The thing i didn't like is that you can't put more than 1 product at the same time.

Comments during conversation

- I will buy Ikea products with or without the app
- The app is a useful tool to make a purchase decision. I never used the app before but I used a program on the computer, which is kind of the same. You don't upload a picture, but you can draw the space you have which is what I was used to do, as I used to do it in Autocad). So in this Ikea program I put my room's measures. The idea behind it is that the more visual it is the better in order to visualize the final effect.
- As I didn't have a purpose to buy something, and as I wasn't looking for anything at the moment. At this moment it's not helpful. But if I'm looking for something, then i think it might be helpful to use the app and it can help in making a purchase decision.
- As for information, I think the other tool, the Ikea store, is a better tool to collect information, as it gives all the product's information.
- I think it's nice, well design even if it could be better overall.

3.2.3: I3

Name: I3
Gender: Male
Nationality: Italian
Age: 23
Other demographics: Business Student

Observation

Location: University
Lighting: Natural Lighting
Overall impression: The interviewee was serious about the experience. It was very analytical and critical. He tried not too many products and positioned them in different positions in order to study the final effect. He would make them bigger or smaller depending on the idea he had in mind. I couldn't observe any playful driver while experiencing the app

0.15min
By scrolling through the products, choses the chair
"I'm trying to put the chair close to the wall. But it's a bit complicated. It's hard to calculate dimensions!". Pulls the ones closer to him trying to re-size the chair.
0.52min
He moves the phone back and forth. He's very focus.
"I'm trying to figure out but I can't understand the dimensions of the chair in reality!"
1.15min
Among the products, choses a bed.
"Look at this bed...You see the main problem here is that we can't really understand the dimensions of this bed here?"
1.53min

Try the bed in different positions in the space and from different angles.
Moves the phone around him as well.
“It’s not that easy to put the objects around, even though overall I like it cause you understand how objects look in your room”.
2.15min
Re-sizes the bed, by tapping on the screen.
Moves the phone closer to his eyes.
2.35min
Changes product. Goes back and forth among the product.
“Lets try this yellow shelf!”
2.50min
He moves the phone around. “See? This is not the real dimension of the shelf? Probably it’s more like this?”
Re-sizes the shelf dimension taking as a benchmark the door in front of him. He tries other products.
3.20min
Overall I think this are my impressions. “Aw, wait lets try this bookshelf with the mirror? Aw it’s not a mirror!”
3.42min
Nice! You can also save a picture. So I can chose if to put there a shelf or a table! Cool!
4.06min
End

Interview

Question 1: Please describe your experience with the app.
The main problem is that it’s hard to calculate the real dimensions. Let me explain: i can make the chair bigger or smaller based on what I want to do, but it’s difficult to understand the real dimensions of the chair once you put it in the space. For example you can imagine this bed here like this, but we don’t know it’s effective dimension in reality, because it’s not this. The application should create the dimension based on reality not as we wanted to be.
Another thing to improve is the user friendliness of the app. It’s not that easy to put the objects in the space as where I want it to be. Generally I like the idea, as you can understand overall how the objects look in a defined space
I like that you can take a picture of the space. So that if you have to choose furniture to pick you can confront different pictures and options
Once you can put the furniture correctly in the space is actually nice.

Question 2: What is the first word that comes to mind when you think of your experience?
When I think of this app I think of “Immediate”. You can compare different options from home without necessarily go out, it’s fast and instinctive. You do everything at the moment where you are

Question 3: What did you like/ dislike about the app?
The thing I liked the most is that you are at home and you have to choose based on a catalog/different given options. So you put yourself where to put the furniture and you can do it from home directly.
The thing I liked the least is that even if you can compare different things, in reality then it’s different. Dimensions and colours are different, so you can’t make a realistic and true image of how it would look in reality.

Comments during conversation
-

3.2.4: I4

Name: I4
Gender: Female
Nationality: Italian
Age: 20
Other demographics: Business Student

Observation

Location: University
Lighting: Natural Lighting
Overall impression: It took time for the interview to understand how to position the products and make them fit in the environment. It was complicated to handle. It took time to understand how to move objects in the space. Her experience

was a mix between fun and trying to figure out which were the best products that could fit the space where she was. She was immersed and tried to turn the products backsides as well as change the dimensions in order to fit the space.

0.30min
Scrolls through the app. Choses a shelf and tries to put it in the space.
The shelf doesn't always stays perfectly in the place where he puts it.
"It's a bit hard to handle!. The Shelf disappeared. Ok now it's back."
0.45min
Studies the shelf in relation with the space. He is surprised.
"The shelf doesn't move with you! You need to drag it."
1.05min
Changes product. This time is a sofa.
She turns with the phone and moves the objects around. She smiles while doing it
"It's actually pretty realistic. Nice"
1.30min
Scrolls through further products
" ...are the models precise?
"Can I add more than one? It would be nice if you could create your own room"
2.03min
Goes for the bed now.
She looks intently to the phone and taps the screen to re dimension the bed in the space.
2.30min
Moves the phone closer to observe the screen.
"I think it's realistic, but colours are a bit fake"
2.45min
She puts a box on the wall exactly where a guy is looking at. She laughs as by moving the box, it goes on the head of the guy.
3.02min
Taps different products and tries to select more than one.
"I actually would put more objects together? Do you have real sizes here?"
3.33min
She explores the app, typing different sections and collecting more info
4.00min
My doubt here is that if I don't have real dimension, i can put every object here, but they wouldn't match with reality.
4.15min
End

Interview

Question 1: Please describe your experience with the app.
Overall I found it interesting. I never used such an app. I think it's nice that you could have a first snapshot of what a piece of furniture would look like in a room

Question 2: What is the first word that comes to mind when you think of your experience?
Useful. I think it should be for older people. I mean now I'm not in an age where I look for furniture, but for people older than me it could work.

Question 3: What did you like/ dislike about the app?
The thing I liked the most is that you can have a preview of what a space would look like. You can have an idea of how colours would kind of look like (i can imagine my mom, who cares a lot about colours) . I didn't like that I couldn't put more than one product and that the dimensions are not realistic. You can make products bigger/smaller as much as you want, but this is not helpful. You should do it based on real terms.

Comments during conversation

- The models are precise right? You can't add more than one? It would be nice if you could create your own room for example.
- I think it's kind of realistic. Colours maybe not too much. I would put more objects together.
- Does it give you information about the furniture's dimensions? The fact that you can make the furniture bigger/smaller as much as you want does not give you the effective dimension. For example with the app I can put the furniture right where I want it to be. However in reality it might not fit, so I created this nice picture, but then it's not useful. They should do it with the effective dimensions.

3.2.5: I5

Name: I5
Gender: Female
Nationality: Italian
Age: 20
Other demographics: Business Student

Observation

Location: University
Lighting: Natural Lighting
Overall impression: The interviewee started playing around with the app. The positioning not realistic the products in the space she had in front of her, like a bed in front of the elevator. The playful aspect prevailed. However after a couple minutes she started using the app in a more realistic way, trying out product that could fit in the space around her. She tried to position them close to her as well as far away in order to study how the app would react to distance changes.

0.26min
Scrolls through the products and choses the wardrobe.
“Let's try the wardrobe.”
She puts the phone at eye level and she turn the product upside down
She smiles.
“It’s not bad”
1.16min
“Ok let’s change.”
She laughs. Chooses a chair.
“ I’m creating a relax area, what do you think?!”
1.45min
Let's put this chair here. Why not?!
2.20min
She moves the phone up and down, and constantly taps the screens to re-size the chosen products.
2.50min
Choses a bed
“Why is this bed in the air? “It doesn’t go down on the floor?”
Moves the phone around
3.20min
Changes product.
“Let's put this bin here”.
“It’s so close. It’s a bit in the air.”
“It’s doesn’t stick to the ground.”
4.10min
Scrolls again through the different options
“This blue cube could go on the wall here”
“I can’t understand, the dimensions are weird.”
4.34min
Surprise emerges when seeing no lamps in the tab
“I like lamps. Lets try it. Umh..The lamp tab doesn’t have anything?”
4.47min
“Lets choose something for the entrance”
“Entrance….Let's’ put this “cloth hanger”. Ok….Everything here is in the air”
5.22min
Moves the phone further away from her.
“Lets try a bit further If I put it further it actually stays on the ground. Maybe before I was pointing to close”
Switches to the bed.
“ Let's put this bed in front of the elevator.”
5.45min
Tries again to insert two products
“I can’t put more than one object?! right?”
6.15min
“Nice! Why not a baby bed here. She scrolls around more products. “Ok I think I got the concept”.
6.30min
End

Interview

Question 1: Please describe your experience with the app.
I liked the experience and the idea, By using the app you can actually make a project. I appreciated that I could see the furniture in the room.
I think the quality it's good, if you point the camera to a wide open space the feeling is more realistic. If you select a piece of furniture to close to where you are, then I would say it's less.

Question 2: What is the first word that comes to mind when you think of your experience?
Nice. I think it was an interesting experience.

Question 3: What did you like/ dislike about the app?
What I liked the least and I think it could be improved, should be to insert more objects in the space, to better understand the overall picture. In a room you normally have more than just one piece of furniture.
What I liked the most is that I could play around with the furniture, choose among different options and visualize things.

Comments during conversation
-

3.2.6: I6

Name: I6
Gender: Male
Nationality: Danish
Age: 24
Other demographics: Business student, not interested in furniture

Observation

Location: University, slightly furnished room with some chairs and a table, white walls without any decoration on them
Lighting: Bright lighting
Overall impression: Very explorative and playful behaviour, resizing products to weird sizes, only choose a few products, found all features of the AR feature

0:20min
Quickly figures out where to find the products, moving around phone for camera function
0:43min
After choosing first product, a chair, he laughs amused
Moves around phone to find chair again (moved phone away from it while laughing)
Finds that he can move the chair around on phone screen
Places chair on top of a stack of paper
1:00min
Excited exclamations ("Chair went away!"), when chair jumps of own accord
Smiles while placing chair, chuckles, "I do believe a Pikachu just appeared"
Moves phone slightly from side to side
"How would that look there?" - moves chair around, slight smile on face
1:19min
Asks "Is there any way to stop them from jumping around?"
When answer is no, he chuckles and smiles, turns back to phone
1:26min
Chooses new product, finds "I can only have one at a time" - no more smile on face
Moves around product
1:35min
Finds Image saved function, then furniture recentered function, then buy function (which doesn't work)
Goes back to placing product, same chair as before, and then tries to find it through buy function on website (doesn't work 'not available')
Asks why it doesn't work "Have they not linked it up yet?"
2:10min
Stands up with phone in hand
Turns body around, placing product

Moves through room to place drawer in front of the door
“Now nobody can enter the door”, smiles
Turns away from door again “This is .. what is this?”
Turns body around, takes a few steps - “No, no, no - go back”
2:40min
Places pink closet at wall, steps back to better see it with phone “Very nice”
Moves body and phone sideways in sweeping motion
“Can I change the colour?”
Tries to find option, chooses different product “That would be better, yes”, moves body to better see
3:00min
Walks back to chair “What else do we have?” leaning forward to rest on table
“There is a lot of things”
Looks at product categories “I don’t understand the categories here. This is closets and chairs.. [Exclamation] Children’s Furniture it says”
Scrolls through different categories, exploring
3:30min
Finds product he likes “Nice big TV”
Leans back in his chair to better see product
Rescales product, smiles, “It’s funny at least”
“It seems a little graphical”
Reads instructions “how to use this feature …”
3:45min
Finds the ‘use Ikea catalog option’ - expresses wish to try that too
“Can the catalog magically draw out furniture? That is pretty rad.”
Explores FAQ function
4:30min
Chooses a couch - “It disappeared! Oh, here it is [after sweeping motion with phone]”
“This is a cool couch. But it is not showing” - phone is not responding.
“It placed a chair on the table earlier, so that can’t be it”
Restart app
5:50min
“So now if I can find that very ugly couch again” - looking intrigued
Finds couch.
Places it, smiling “Yes, this is brilliant”
Swivels in chair to place it in open space,
rescales couch. “It looks like the rock one at CBS. Very ugly” Laughs
“It would be nice to have a couch here”
6:25min
Moves back with chair to better see couch
Swivels phone back and forth
Looks at space without phone, starts laughing
6:40min
Chooses other couch “Red couch”
Exclaims excitedly: “Oh! There is two! It’s a set”
“It opens! There is the regular one and then there is the open one”
Tries to rescale “It is not always responsive”
Intensely focused on phone, rescaling and recentering couch
7:00 min
Lowers phone “It’s getting a little bit boring”
End

Interview

Question 1: Can you describe your experience with the app?
It’s very … It’s a fun little gimmick. I don’t know. Maybe it’s actually better if you have the catalog. I am not sure if that is actual products, because they look very graphically. I mean they don’t look well enough for me to believe that they are chairs. They look .. [laughs] like Pokemons - but as chairs, because.. It looks very imagery .. and stuff like that .. it’s not … but I mean … also I am not a furniture person, so maybe that’s why I don’t see the merit of it .. I mean it’s … I guess it’s nice. Sort of like picking the magazine up and doing like this [pretends to keep looking over top of a magazine that he moves up and down] … and then looking up and then down. Because you tend to overfocus on the thing, also because it jumps around a little bit. It doesn’t stand still. You can’t really place it and be like ‘Stay there’. And then sort of watch the room. Of course you could take a picture. I didn’t really do that a lot. I imagine if you take pictures you can actually sort of .. and also you could only have one furniture there. You couldn’t re-furnish the entire room. That made it less useful than I

would imagine it to be. But I mean it was fun and it was like .. yeah cool. I can't believe IKEA paid a lot of money to develop this, because I am not sure how many people will use it, but I'm not an Augmented Reality expert.

Question 2: If you have to describe the experience in one word, what would that be and why?
Gimmicky. It seems more like something I would at a dinner party be like "see what I made. Look at this. Now we can re-furnish the room" We'd have fun with it for five minutes. But it doesn't seem like something I would use when actually making a buying decision.

Question 3: What did you really like and what did you really dislike?
I really disliked that there was not multiple furniture .. and I really disliked that you couldn't… unless you took a picture, you couldn't ask the furniture to stay somewhere. It's probably hard with garbiscopes and stuff like that. But that made it.. that made me .. that made it apparent all the time that I was in Augmented Reality. I never had the illusion of .. there actually was furniture there, because the furniture was always … [indicates jumping up and down with his hand]. Soo.. I disliked that.

I liked the idea of the catalog, if it works. That is super-cool. I mean then I'm starting to see potential in it. … And I also like .. I think it was sort of intuitive once you got the hang of it.. You could just center and .. it wasn't hard to use .. it's more .. so the intuition was easy. I found out how to use it quickly, but the finish wasn't that well.

Comments during conversation
It's cool that you can try new things, but it gets boring after a while.

Used L'Oreal after that
- Liked the quality a lot more
- Expressed joy, playfulness and curiosity

3.2.7: I7

Name: I7
Gender: Male
Nationality: Danish
Age: 22
Other demographics: Business student, very interested in finding furniture that fits well with the rest of his apartment, chooses expensive fitting furniture rather than cheap

Observation

Location: University, slightly furnished room with some chairs and a table, white walls without any decoration on them
Lighting: Bright lighting
Overall impression: Very analytical way of exploring app, takes a long time to choose a product; tries to place the products fitting with other products, e.g. a chair in between the other chairs in the room, stays seated, not moving around too much

0:26min
Looks at instructions
"Oh, so you can actually.. Oh nice" Looks intrigued
0:47min
"And I just …"
Enters product category, leans back to have more space "Ahh"
Smiles "It's like Sims"
"How do I go back"
1:00min
Looks at chairs
1:05min
Chooses one, Exclamation of surprise "Oh! .. This is fun" Smiles
Moves chair around, and rescales it
"So you can actually decorate your home", chuckles, smiles
1:18min
Moves body and phone around, "oh"
Looks at products
"It's difficult to talk and do this at the same time. I really want to find the perfect product"
Keeps scrolling through products, "It's really fun. It is like Sims kind of"

“It could be really cool to have. Is it an app I can download?”
Keeps scrolling through products
Looks at the product he already placed “so i can decorate my own room”
1:58min
Moves around a bit with chair to have more space, rises phone up higher
Picks a new product “When I pick a new thing, the old one disappears”
“So I can only have one thing”
2:13min
Resumes scrolling through products
Swivels chair to the side, picks a product, face shows signs of ‘aha’ thoughts
Chuckles, “That is pretty cool”
2:35min
Scrolls through products again
Chooses product “Oh”, rescales it
Moves product
2:43min
Chooses product which multiple product options next to each other: “Is it supposed to do this, where I just scroll…”
3:00min
Finds a new product “This is nice”
Chooses it, and rescales it
3:15min
Swivels in chair to place product somewhere else
Scrolls through products
“And it’s all from their own catalog?”
Keeps scrolling
3:44min
Chooses a new product, moves it around
3:48min
Starts scrolling through products again
“Maybe they should write what the categories are about”
4:14min
Chooses new product
Tries to place product in specific location
4:24min
Turns around phone (so it’s horizontal)
Rescales and moves product
Scrolls through products
Rescales product - “Och”
Scrolls through products
“Could you take more than one furniture at a time?” -*No*
“So you can’t really use it as an app to redecorate stuff, you can only see how one product fits into it for example”
5:04min
Turns phone back to be vertical
Resizes product
“And this is really an app, not a beta version?” -*Yes*
5:16min
Scrolls through products again
“So they have no lighting”
Scrolls through products
5:39min
Moves product
Re-scales it
5:45min
Scrolls through products again
“It’s not all the products in there. How do they select them? Do they change them?”
6:30min
Chooses new product “Oh”
Scrolls through products
Moves phone sideways, then tilts it back and forth
Rescales product
7:05min
Turns back to table, first with phone facing table, then tilts phone upright
Scrolls through products
Rescales product

Tilts phone back and forth
7:40min
Scrolls through products again
Moves chair to face open room
Keeps scrolling
Moves product and re-scales it
8:30min
"How do you drag it down"
Moves chair back
8:40min
Moves phone closer to face and back
Tilts phone sideways, up and down, forward and sideways, moves it around head
8:55min
Moves product around
Keeps moving phone
9:20min
End

Interview

Question 1: Could you describe your experience?
It was a creative idea to use that kind of interaction between the company and its products and the experience you need to have as a user, and how .. and bringing the product to people's homes. I think it could be a good idea … app for people to have. Instead of going out. They can have the catalog and see if the furniture is something they would like in their home. So in that point I think it is a good app, but I think there is still something they could change. Because there is some difference between when you dragged it around and the size when you scale it up and down. And that you can only have one product, so if you would like to see how they fit together it could be difficult .. to match. But as a beginning .. the app I think it is pretty good. It is pretty fun.

Question 2: How did you feel when you interacted with it?
I felt that I had the chance to see the product that I might want to buy and I could imagine that if I had imagined that if I would buy a specific piece of furniture like a chair or something then I would definitely see if that matches. If it isn't a match, then I could say 'Ok, I can take another chair that fits'. But I think it's pretty cool.

Question 3: If you had to describe the whole experience in one word, what would that be?
… In one word .. futuristic, I would say. Because these kind of apps are the future. I think we will see more and more with this kind of interaction. I think it works. And it's a good way for companies to show what they can do.

Question 4: What did you really like about the app, and what did you really dislike?
I really liked, as I mentioned before, that you can take the product, choose which one you like and then if you did not like it you can take another product.. I'm not sure I liked all the products. Because I was not sure if they had all the products. They only had two couches. Maybe they should update it, or .. have even more. But I can also see that it has disadvantages with IKEA that has so many products, to have all of it in there. I don't know how they will work that out. But is difficult something that has a digitalized app … they cannot show it all, but it is something they can work on. .. I really liked how you can take one and see how it works

Comments during conversation

- After also asked to use the L'Oreal app
- Laughter, pulling faces, exploring the app

3.2.8: I8

Name: I8
Gender: Male
Nationality: Danish
Age: 26
Other demographics: Business student

Observation

Location: University, slightly furnished room: table and chairs, TV
Lighting: Bright lighting
Overall impression: At first uses app very much like its intended purpose, trying to put products where they are meant to be. Takes a lot of time to look at/ move/ re-size one product. Later becomes very playful with the app. Rather exploratory behaviour.

0:28min
Reads through apps concentrated
0:47min
Swivels in chair to start, facing the room
Tries placing a bed - “Oh, it’s a bed”
Moves chair closer to where he projects the bed
Tries placing the bed on a specific spot
1:28min
Chooses new product: wardrobe
“I have some difficulty … [moving the bed]” - “Ah” when figures out
Tries placing wardrobe to block the door
1:40
Chooses another product: bed - “Ah, you cannot have both”
2:16min
Takes a screenshot
Tries to place table next to bed “that removed the wardrobe”
Rescales, and moves products
2:50min
Chooses table
“I can kind of understand what it is for… to see what it looks like in the room”
Rescales product “The thing is I have no clue how big this actually is”, chuckles
“I can make it be as big as the whole room if I want to .. I can also make it tiny doll-size”
Places product in the corner “which is maybe a bit troubling when I actually do a visualization of my house”
Keeps moving product “I like that I can move it around”
3:34min
“It is a bit shaky. It’s a good visualization of how it would be if there was an earthquake”
Keeps moving the product
3:55min
Finds buy function “Oh! I believe this is a description of the product”
Tries to get a picture
4:20min
Explores other category
Chooses a new product: table “Oh this looks nice”
Tries to place it in the corner next to the door
4:39min
Rotates body and phone: “Oh it’s not there, but if I turn back it is there”
Explores functions further -> finds tutorial
Finds re-center option “Oh”, leans forward towards the product
Moves product
5:29min
Tries to place it under TV - “that sort of looks like it is real”
Laughs “.. and someone is trying to crawl under it. Maybe it is that my hands shake”
5:45min
“Let’s see what this is” choses a product “Ohh.. a neat chair”
Tries to placeit with other chairs around table, moves his chair to better see
6:05min
Moves chair to window to next room
Tries to place chair outside of room
Places it back into the room
6:18min
Moves to the other side of the room
Observes how chair moves of own accord, when he moves “Ah now it is here”
“Oh, now it is actually a miniature chair on the table”, smiles
“A good place to have a cat”, starts experimenting with placing the chair on table
“It is actually more of a hamster chair”, re-sizes it
6:40min

Tries to find information on product, Exclamation “Oh! Again, not available”
6:50min
Tries to find if he can manage to place more than just one product
“It would be really cool if I could make my own miniature home on this table”
7:30min
Realizes it does not work
Takes screenshot
Chooses new product: dinning room table “elegant table”
8:00min
“This is actually weird. The other ones looked like a real bed or closet. But this table in particular looks very animated”
Moves face closer to phone “Is that .. or is it .. it is animated!”
8:29min
Goes back to other products “Now I am curious. Now I want to go back to those others …”
Chooses product “Funky sofa … that is also animated”
Chooses other product “This doesn’t look animated. Well it does, but not that much”
Turns body back to room “If you take it over here. It doesn’t look like it. It sort of fits its natural setting”
9:05min
“This would be nice to have in the TV room”
Re-scales “I can see, if I zoom in and out that it is probably way bigger than it is here”
“But here it looks really neat”
9:30min
Breathes out loudly - chooses next product
“That looks animated as well. I guess it is animated. Not a big surprise”, chuckles
9:50
“Now that I have explored all the options, I just want to push every single button”
Tries different things
Talks with app “Come on”, “Bubb”
10:25min
Annoyance at jumping out of FAQ function
Finds FAQ again
“I don’t really think these are the FAQ. The FAQ should be can I have more than one furniture?”
“This is all .. can you do this- yes you can. Like politician questions. Ask me this.. I’m glad you asked”
11:11min
Takes another screenshot
Focuses phone on his bag on the table
“I realize now my bag is out of focus, but the product isn’t”
11:30min
Swivels chair, re-centering products
11:46min
Tries to place furniture on the interviewer
“There is a coat hanger sort of in your nose right now”
“It looks like a piercing”
12:00
Stands up, goes to window “I am curious. Can I place it outside?”
Attempts to place furniture in the street
“I can make it look like there is a giant coat hanger outside”
“I sort of realize why you can only place one furniture at a time now”
12:30
End

Interview

Question 1: Describe your experience.
I just experienced playing around with furniture through the IKEA app. I think it was funny. It’s a nice way to interact… with different things. I think it’s innovative… and I think it could be a funny way to so if something fits. But I don’t think it would be like a … I mean you only see… I mean it wouldn’t be like that. When it comes to it. It’s only like .. a projection. And .. the sizes … it is very hard to determine how big something actually is, because you can place it anywhere… like make small tables and chairs on the table here.. If I could have two things at the same time, I could make a little dollhouse, which I thought could be really cool. But seeing how everything jumped around, I could also see how that could be difficult. In terms of, if I found something I need … like if I wanted to be more interested in those furniture … maybe … I actually see it as a better way, or more fun way to get to know more products. Because you can play around. The thing is you just find the most weird thing you can in there .. I tried to do that … I actually think it would work better if it was still, like … because

everything jumps around when you move the camera in and out, or you move position.. The app has replaced your furniture in the wall.

Question 2: If you have to describe the app with one word, which one would you choose?
Fun

Question 3: What is the thing you liked the most/ and what did you dislike the most?
What I liked the most is .. you could actually do a visualization.. Of a product, which is kind of cool. But, where I think it would be really interesting was .. you could like go into an empty apartment and create your own room. Which is not possible, so that's kind of a dislike. And also the bouncing around… is … impossible to avoid I guess, but … a bit annoying.

Comments during conversation
-

3.2.9: I9

Name: I9
Gender: Female
Nationality: American
Age: 20
Other demographics: Exchange student; interest in IT

Observation

Location: University, slightly furnished room: table and chairs, TV
Lighting: Bright lighting
Overall impression: Takes along time looking at products, before choosing it. Doesn't take too much time actually interacting with the AR; after a while she begins to be playful with it

1:05min
Reads through description
1:20min
Starts looking for furniture
Clicks into product category - "Uhhh", smiles
Scrolls through products, smiling
1:38min
Chooses product: chair - "I already forgot the instructions"
Sees product - big smile "Ahhhh"
Moves product, resizes it, rotates it "Oh, I can resize it"
1:50min
Turns body to look at the big room
"Where did my chair go?"
Turns back, Astonishment: "Ohh! It stays in the same place"
Places finger on chair, turning body again to move chair into the middle of the room
2:08min
"It's so small"
Resizes it "This is so cool"
Moves chair around, "I'm just trying to get the hang of moving it"
2:20min
"Sometimes it just gets bigger, when I just move it. But I guess that is ok"
2:30min
Looks at other products - "That's a drawer, that's not supposed to be with the beds"
Recognizes the categories
"Which bed do I want. It's weird, because the nightstand throws me off"
Keeps scrolling
3:05min
Picks bed, "Hey where did my chair go?"
Swivels body, looking for chair - "Did my chair disappear?"
"Oh, I only get to do one thing at a time?", keeps swivelling back and forth
Leans back in her chair "Ok. How do I get a whole room then?"
3:20min
"And why is it only giving me the drawers of the bed?"

3:25min
Scrolling through products - “Ok, I guess I can’t do then my own Barbie house”
Chooses new product
“Oh.. so I am only looking at these one on one” sounding disappointed
3:40min
Tapps on bed “I can’t interact with this. Well that would be amazing”
“Strange, just the drawers”
“I feel like there is no point moving through the room, because if I pick one the other goes away”
Keeps scrolling
4:00min
“Uhhh!! Children’s furniture! I am a child”
Keeps scrolling, smiling
“There are so many categories”, scrolling
“They all look quite similar, because they are all just stick drawings of furniture”
There is nothing in lighting. Well that is a deceptive category”, keeps scrolling
“Why is there no entrance?”
“Interesting category”, still scrolling
4:45min
Exclaims “Oh, I saved a picture!”
Finds re-center option “Oh! It recenters it”
5:00min
Swivels body “What if I moved here?”, presses re-center button
“Ohhh..!” sounding pleased, smiling
Swivels back with body - “That is how you get it from one place to the other”
Swivels again, pressing re-center button “Technology, wow!”
5:15min
Finds buy function “Wow. Ohh.. It wants me to buy it… ohhh… ok, now I understand this app”
“Ohhh… I get it. You do the AR, put it in your room and see how it looks and then it gives you this to buy it”
“Ok, cool”
5:45min
Starts scrolling through products again
“So if I were to buy a sofa..”
Exclamation “uuu”, scrolls, picks sofa
Rescales sofa
“So if I pick this can I buy it?”, presses buy option
Reads “not available on the ikea website”
“Interesting”
6:28min
“I think I explored the app. I am not bored with it yet”
Keeps scrolling through products
“I am just looking at all these products.”
Scrolls through products, sings to herself
6:45min
“A closet! Uuu”
Chooses closet
Resizes it “Is this the back of the closet, is it the front of the closet? It is just transparent”
Taps on it “See, if I could interact with it, then I could …”
7:00min
“I feel like it’s flawed, because it doesn’t stay there. When I move the phone [moves phone] it jiggles with it kind of”
“Or actually. Maybe that is just me not used to it”, keeps moving phone slightly
“Cause it is throwing me off a bit”
“It’s staying there, but is also kind of not”
7:25min
“What if I put it on the ceiling? Can I do that?” Tries to drag closet onto ceiling
“How do I move it again? What are the instructions?”
Looks into instructions - “Oh, drag it. I have to drag it”
7:39min
Gives up “Maybe it is too big”
Scrolls through products “uuu.. These are funky chairs”
“Nice!”
Keeps scrolling - “Ok some of these are not work desks”
7:59min
“Ok, that is actually kind of ugly”, Chooses a product
Tries to drag it “How do I drag it? How did I move it before?” sounds a bit annoyed

Moves her body to the side “Oh, if I just re-center it”, recenters product
8:05min
Swivels to face the ceiling
Tries to place product on the ceiling “If I recenter it on the ceiling..”
“It doesn’t recenter on the ceiling”
Moves back to normal position “It recenters here”
Moves phone to look at floor “Down on the floor? Oh, it can get down on the floor!”, resizes
Moves phone to face ceiling again “Why can’t I get it on the ceiling? No, i can’t get it on the ceiling”
8:27min
Moves phone to look at interviewer
Smiles, “I can get it on..”
Turns back towards front “I wonder why it doesn’t get the ceiling”
Starts scrolling through products again “What if I was looking at chandeliers?”
“Because I am rich enough to do that” starts laughing
“Then I couldn’t put it on the ceiling” sounds disappointed, keeps scrolling
“What else goes on the ceiling? Lights and stuff”
8:59min
Scrolls through the products “oh. Have the chairs changed?”
“I feel like there are more chair options”
9:09min
“I’m actually getting more annoyed at these icons”, keeps scrolling
“Some of them are so similar. They are just stick drawings and it is difficult to differentiate”
“They are cute, but maybe there is a better way to do that”
9:35min
Chooses drawer
“Oh wow! Nice drawer”
Moves it “I am having trouble moving these products. I can resize them, that works fine. But i can’t like move it where I want to”
Presses recenter “I can recenter it”
Rescales it “Now it is so small, I can’t even re-center. Is it my fingers? Is it me”
10:16min
End

Interview

Question 1: Can you describe the experience you had with the app?
It was cool. I’ve never used a AR app for furniture before … I mean it was a little bit frustrating, cause I was trying like .. move it, and then I couldn’t. It was just .. it was like nice, because it was like virtual shopping. So I am like just playing around with the products.. And it was like … I could see how it would be like a nice game.

Question 2: Do you think it would help you make a purchase decision?
Yeah. I think it would. … Especially because furniture is so .. ah, like tedious … the process of like purchasing furniture is so tedious … like the objects, you’d have to go to the … the way you do it in the us is that you either go to the showroom or you go to the website. And then on the website, you can’t really see what it looks like. It can be deceiving. And the showroom, it’s like very inconvenient… compared to the website. So I feel like AR furniture shopping is pretty cool actually.

Question 3: If you have to describe the experience in one word what would that be?
I’d say interesting, but I don’t think that is helpful. Why interesting? Because there were cool parts, and there is also parts that were frustrating. Cause if I said it was frustrating, it would kind of mean that I had a bad experience overall. But I didn’t. There were just some part that were like .. yeah that could be better. But it was still cool to like try it out and just play around with it.

Question 4: Do you think it would affect you the frustration bit in your decision making?
Like my decision to buy furniture? Yeah, probably… hmm .. somewhat. Because maybe if I had a bad experience, like if I couldn’t get a piece of furniture where I wanted to get it in the app, it would make me less inclined to buy it. But on the flipside, if I really liked a piece of furniture, the way it looked. Then I guess it wouldn’t matter… if I couldn’t drag it, or move it around or see exactly how it performed.

Question 5: What did you like the most and dislike the most?
I really liked looking at the furniture .. it’s just like, I guess, mind-less shopping. Oh that looks like. That’s cute… and just playing around..
And what I really didn’t like were two things. Like the icons were like too similar to me. And .. then I couldn’t drag it and that was really annoying.

Comments during conversation

- Correction from her answer: the app negatively influenced her brand interest
- Exploring the technological quality of the app, actually made me explore the app more than I would originally

3.2.10: I10

Name: I10
Gender: Female
Nationality: German
Age: 24
Other demographics: No student, biochemical assistant; very anti-app

Observation

Location: Her loft apartment, fully furnished, but a lot of space
Lighting: dark outside, artificial lighting, not too bright
Overall impression: She appeared to be very critical of the app, yet at the same time curious, she moved around actively in the room from the very beginning, she did not choose anything she tried to place in relation with her own furniture, but placed the products in the middle of the room

Note: Unfortunately, the camera did not record the observation part

Looks for furniture
Experiments with re-sizing option
First exclamations of surprise, then of skepticism
Confusion whether product actually stands on the floor or is floating
Chooses several products
Expresses skepticism
Moves in the room, walks around the product she placed
Laughter
Chooses different products
Criticises that it does not look realistic
Expressions of curiosity - “Aha - so I can do this with it”, “What is this supposed to be?”
Compares the app with Sims
Expresses it to be funny (“witzig”)
Moves around in the room
Questions whether she would buy these products

Interview

Question 1: Please describe your experience with the app.
… Well, it’s a nice app for seeing your furniture. But I wouldn’t buy my stuff through this app. I want to see it in the store.

Question 2: How did you feel when you interacted with the app?
Like in a computer game.

Question 3: If you had to describe the experience with one word, what would that be?
… [long pause] interesting. It’s something different... I don’t know… Maybe quite helpful to see the furniture for once… but I don’t think it is very realistic

Question 4: What did you like the most/ dislike the most?
I liked that you could rotate the furniture. What I didn’t like was that you can’t put down one thing and then add another.

Comments during conversation

- I am not an IKEA fan, so I won’t use the app again
- It is not so unlikely I’ll buy furniture
- I don’t feel like I experienced emotions during the experience
- I really did not feel empowered… or sad, at all!
- Maybe a bit boring, but it wasn’t that bad.
- The technical quality was quite good, but not optimal

3.2.11: I11

Name: I11
Gender: Male
Nationality: German
Age: 17 (Feb 2000)
Other demographics: High school student

Observation

Location: Bedroom, fully furnished, no open wall spaces
Lighting: Bright lighting
Overall impression: His body language was very much in line with what he was doing; he only lifted the phone to his face when he actually used the AR function; spent a lot of time with a few products. Did not choose many products. Did express concerns with pricing

0:31min
Sits with phone pointed down towards the ground
Starts scrolling through the instructions
“Seems simple enough”
0:46min
Looks at functions on top of app
Humms to himself
Then at bottom “Ok, seems like I need to choose an object here”
1:50min
Scrolls through products
Looks up into his room to see what fits, looks back down, then up again
2:11min
Raises up phone to face height
Chooses product
No visible reaction to it appearing
Rescales product
“Wha! It’s gone!” smiles “ok, my first attempt failed”
2:17min
Goes back to comfortable position with phone pointing to floor
Chooses a new product: chair
Then raises phone again and moves it sideways
Rescales and moves object, rotates it -> tries to put it where he wants it to be (in context to other furniture in the room)
“U, it’s too big” pulls a face, rescales it
3:25min
“Soo, I got it” laughs
Then shifts focus to function in the bottom
3:40min
“The left one was objects, this one might be pictures” presses it
“Oh!” slight surprise “So, it took an image, and I am going to show it to my mom”, smiles
“This is what I want”
Finds buy-option “Nooo!! [pulls a face] What the fuck?” starts laughing “a little bit too expensive”
“So I have to choose something else”
4:07min
Bends back down to scroll through products
Chooses a product, straightens again
Swivels his body to both sides “ohh”
Chooses lamp category - “but no lamp is coming up. Scheiße!”
Sighs - “what else?”
Scrolls through products
4:44min
“A bed?” looks around room with skeptical look
Back down at phone “no”
Scrolls through products “chair; new table”
Exclamation “oh! This one looks good”, straightens and chooses product
4:59min
“Ahh, now the other image disappeared. So now I can’t place things next to each other, can I?”
“Hmmhmmhmmhmmhmm” - scrolls through products
“Let’s take a cheap chair this time. I think it will be better” chuckles
5:30min

Chooses a new product “Ok, no. I can’t use two. Which is sad”
Humms to himself, moving the object “Now I am just messing around”
5:51min
Straightens, moves body to face interviewer, who is sitting next to him
“Hmm” rescales item; places a chair on shoulder of interviewer, smiles
“That’s what this app should be”
6:08min
Bends back down to choose another product
Moves back to face interviewer, places new product on shoulder
Resizes it
“It seems to me that as soon as I make an object really, really small..”
“Oh, ok. It’s harder to use, but not impossible”
6:30min
Moves phone back and forth between shoulder and his face “hmm”
“If it is really small it is very hard to get it big again, or do anything with it”
Distances phone from his face [stretching his arms our] chuckles
Tisking sound “so now I want to choose a different one”
6:58min
Bends back down, and scrolls through product categories
“I am disappointed there is no lighting”
“Oh!” humms to himself while scrolling
7:16min
Starts laughing to himself “the chair is not the prettiest one”
Chooses a product
Stretches phone really far from his body, then leans back with phone in hand
Repeats movement “It doesn’t stay in the same position. The object is relative to the camera, not the room”
Smiles “see. Now it is right next to the chair” [with arm outstretched]
Leans back “Now it is more next to you - which is sad”
Hums to himself, scrolling through products (this time phone upright)
8:20min
Swivels body around “Maybe good because you can walk around and look..”
Moves arm sideways “which is interesting, because if you pan, it stays”
Moves arm back and forth “so only when you go further away it changes”
Swivels phone sideways “but it does have a panning option”
Humms to himself
8:46min
Finds re-center option “Oh! Recentered! Oh, ok!”
“I thought it was an undo button, but it was a re-center button”
Crouches back down, looks at price “Woah! Alter!”
9:18min
End

Interview

Question 1: Can you describe the experience you just had?
So, I assume the app is used to .. try out furniture from IKEA in your room, so that you can see how it actually would look and that the buying decision gets easier… It wasn’t too hard to figure out. The only thing that took me a while.. five seconds longer than the rest is to figure out where to get the furniture from in the first place, because after the tutorial you can do blablabla, it didn’t show you where to get your furniture.

Question 2: Do you think it would be useful to have when deciding to purchase furniture?
…Yeah, maybe. I don’t know [sounding unsure] … Because I am not sure if the imagination of a human is not enough. To like look at the catalog and think ‘ah, it would look like this in my room’. So I don’t know if that app is totally necessary there. But certainly a cool thing… but also I think it needs to … you have to be able to put more than one object together, because right now I can only look at a desk, but maybe I want to buy a chair too. And then it gets really hard to compare two objects. But it’s equally hard somewhere else…

Question 3: How did you feel?
Like the app felt smooth, but…

Question 4: Describe the experience in one word.
… I would say intriguing, but... ‘cause it was fun to figure out how everything works and play around with it.

Question 5: What did you like the most, and what did you dislike the most?

I disliked the most that you can't put two objects next to each other. What I like the most is … how easy it is to move the object around, I would say.

Comments during conversation

- Unlikely to buy furniture from IKEA, which is not the fault of the app. He just doesn't need to buy furniture right now. If he did … The app did not have that many options. It only had 10 chairs…
- The app might get a lot better by the time he buys furniture, then it would be cool.
- Before the app he was very likely to buy from IKEA, the app didn't change anything.
- I don't know that there are any new products after using the app.
- The app did give me information, but I just don't want to try out anything.
- If I couldn't interact with it, it would be stupid.
- Empowered? I could place something on your shoulder, that was pretty cool.
- I was critical, but that is just because it was a survey.
- The only information that I got is that my room is very small, but I could also get that information from looking at the catalog (Interaction)
- Joyful: that would assume that placing objects in my room makes me feel happy. - no not really
- Augmentation: I was critical if that was the right thing, not towards the app
- Technological quality: I was critical, because I felt it could be better. Because it is what I do in my P-Seminar

Appendix 4: Coded observational results

3.1. L'Oréal

3.1.1 Table of codes

Global Theme	Organizing Theme	Basic Theme
Augmentation	Emotions	Amused
		Annoyed
		Critical
		Curious
		Joyful
		Satisfied
		Surprised
	User Experience	Technological quality
	User Behavior	Explorative behaviour
		Physical movement
		Putting look together
	Content	Concept of the app
		Does not look good
		Looks good
		Realism
		Unusual application
	Purchase intention	Unhelpful
Interactivity	Emotions	Amused
		Annoyed
		Curious
		Empowered
		Joyful
		Playful
		Satisfied
		Surprised

	User Experience	Technological quality
	User Behavior	Explorative behaviour
		Physical movement
	Content	Concept of the app
Registration	Emotions	Joyful
		Satisfied
		Surprised
	User Experience	Registration
		Technological quality
	User Behavior	Explorative behaviour
		Physical movement
Overall experience	Emotions	Amused
		Annoyed
		Confused
		Critical
		Curious
		Disappointed
		Joyful
		Satisfied
		Surprised
	User Experience	App navigation
		Technological quality
	User Behavior	Explorative behaviour
		Immersion
		Physical movement
	Content	Concept of the app
		Missing content
		Own abilities
		Product selection
		Realism

		Unusual application
	Purchase intention	Helpful
		Unhelpful

3.1.2. Augmentation

a) Emotions

Amused (4 participants)	• "I'm curious, let's try this Rebel Chick Look" "This would work if I want to be a drag queen. Omg…"She makes funny faces and laughs (L4) • "Then it always looks extreme, but on her it looks good, but on yourself it is too extreme" Raises phone back up to her face, "With her it look as if she isn't wearing any, but with me it looks as if I .. [laughter in voice] .. look. This is her, and this is me" (L7) • Smiles "Pretty, pretty, pretty" [irony] laughing (L8) • Keeps laughing "I should always run around like this, don't you think so?" (L8) • Moves his hair more into his face; "When I have hair over my eye, it applies makeup to my hair" laughs (L8) • "Oh no!" Look at how that looks!" shows interviewer, sounding shocked "Oh my god. That does not work" (L10) • "Oh my god. Look at how I look!" shows interviewer "That does not work!" (L10) • Tries eyeshadow "Now it gets even better" [irony] starts chuckling, then laughing Shows interviewer "I won't take this! But I do think it is also because of the lipstick" [referring to hooker simile] (L10)
Annoyed (1 participant)	• "It's a bit difficult to understand how to use this tool. Why i can't change intensity and it constantly asks me to scan the face" - taps the phone and is a bit annoyed. (#1f)
Critical (4 participants)	• "I wouldn't like any colour. Lets try this one. Aw, I'm embarrassed. I can't see myself like this".(L4) • "So and this is the combination of looks. I really don't like the gloss." (L4) • Looks sceptical "Yeah. Not gonna do that" (L6) • Smile on her face "Omg. That does not look at all .. it looks really extreme" (L7) • "Very dark eyebrows for a natural look" (L7) • "The colours are very intensive. Especially the eyeshadow" (L7) • "And it doesn't look 100% natural of course" (L7) • "Latest look - pink power" tries that "Oh! [sounds critical]" adjusts settings (L9) • "But if it will really look like this .. I doubt it. It does suit me, but if I now buy this strange purple lipstick, if it will really look this good .. I doubt it. I must say it does look good. You can also try good looks" (L10) • ".. yeah, but I personally think that I wouldn't use it to actually buy makeup, because I like to go to the store and see the products and maybe try them out over there, because I am a bit skeptical that it will actually look as it is here." (L10) • Moves her head, looking skeptical "I had the feeling that the blush is looking pink, even though I chose the brown one. I took the brown blush, and it did look brown at first, but now it looks pink. It looks strange" (L10)
Curious (6 participants)	• "I used to use this mascara. I want to see the effect". (#1f) • "This mascara I know it, it's a competitor of my company. Let me try it, I like it, I like the effect. The shape goes a bit up." (I2) • "Let's try the Mascara. Aww nice. Let's try the eyeliner. Cool."(L3) • "I'm curious, let' s try this Rebel Chick Look" (L4) • "Rad. Oh, they are fake lashes, right? - Interesting" smiles (L7) • "How would it work if I had makeup on right now?" *Explanation interviewer* "Ah! Ok!" (L10)

Joyful (5 participants)	• Scrolls through all the eyes products. - After trying different eyeliner products. “Wow, it gives the idea. It’s fun”. (L3) • Starts laughing “That was me”; Smiles, “Oh this is cool” (L6) • “It is kind of funny to see myself extremely pink which would not ever happen, because I would look like a character from a cartoon” (L6) • “It’s fun to see what it does cause it’s .. how it puts on stuff” (L6) • Laughs again “That looks really funny” (L7) • Makeup is applied [first time], a second of nothing, “Whoa!” starts laughing (L9) • “Ahhh! I found some colours”, presses one “Whoa!” starts laughing happily (L9) • “Then let’s continue with my eyes” “But I want to do style” reads through options “Let’s take ‘maga volume’”, chooses options “Aha!” moves head slightly “I do like this” (L10)
Satisfied (1 participant)	• Picks up phone, and enters try it function “Aha! Yes! [smiles] that is good!” (L10)
Surprised (7 participants)	• Makes a surprise face and smiles. Chose the Lipstick tab. “Aww, i want to try this one. Ok,it’s weird!”(L1) • “Lets try the Eyeliner again. Woww, I like it.” smiles and put the phone closer and turns her head right and left to see the effect (L1) • “You can share it. This blush is too intense. Again let's try a new product. Ok and then I can download the picture or put a filter on, so i can share it. Cool, this is very nice. (I2) • She looks at the eyeliner results: “Aw, WOW!” (L3) • Tries on first product “Ohhh!” sound of understanding (L6) • Starts laughing “That was me”; Smiles, “Oh this is cool” (L6) • “Oh! [sounds surprised].. What is this? Ohhh! [sounding pleased] you have looks” Smiles (L6) • Tries it [first time], puts the phone up to her face “Wow.[sounding surprised] Pretty lipstick” [sounds ironic] (L7) • “Ok. Rad. Now I am using the pink power. It is not my colour, but it is surprisingly good” (L7) • Makeup is applied [first time], a second of nothing, “Whoa!” starts laughing (L9) • “Ahhh! I found some colours”, presses one “Whoa!” starts laughing happily (L9) • “Oh no!” Look at how that looks!” shows interviewer, sounding shocked “Oh my god. That does not work” (L10)

b) User Experience

Technological quality (3 participants)	• I think that Eyes cosmetics are perfect and the Lips ones should be less strong. It’s not really me, but it’s nice as it gives me a general idea (L3) • It’s gives the idea. - I like the effects on the eyes. It’s good, it gives the idea (L3) • Eyes are perfect, lips colour should be less strong. (L3) • The app wasn’t realistic at all. It offered few products, colours were fake and it wasn’t even easy to navigate it. (L4) • Think of the lipstick. Not all colours match my skin, and the ones in the app where clearly fake.(L4) • “The lips are made well, but the eyes are extremely too much makeup” (L7) • “Better than with other apps, but still difficult, because it looks like too much makeup.. too extreme and to unnatural” (L7)

c) User behavior

Explorative behaviour (4 participants)	• “Let’s try the Mascara. Aww nice. Let's try the eyeliner. Cool.” (L3) • “It’s fun to play around with it and try on different products and explore the application.” (L3) • “Ok. Rad. Now I am using the pink power. It is not my colour, but it is surprisingly good” (L7)

	• "Let's see what looks good on me" (L8) • "Let's take 'maga volume'", chooses options "Aha!" moves head slightly "I do like this" (L10)
Physical movement (1 participant)	• Moves the phone closer and further from the face to check eyeliner precision (L3)
Putting look together (4 participants)	• After having tried different colours "Ok, so we stick to that one" (L6) • "Ok, now add mascara" (L8) • "But then the lipstick doesn't fit anymore" (L8) • "But I think they don't have my colour." (L9) • "Let's try blue mascara. That always looks good" (L10) • "That does look quite dashing. .. but then the lipstick doesn't work anymore" "But that doesn't matter. We can take this brown, and then choose a different lipstick which fits" (L10) • "But here, a more.." moves her head, scowls, chooses different colour (L10) • "Then let's continue with my eyes" "But I want to do style" reads through options "Let's take 'maga volume'", chooses options "Aha!" moves head slightly "I do like this" (L10)

d) Content

Concept of the app (2 participants)	• I like I could try it on me and have an impression on how makeup looks (L1) • "Lets try again to put on this lipstick and this colour. What does gloss intensity mean? How many times i put it down? (L4)
Does not look good (7 participants)	• "I want to try the eyeliner? Omg, what is this? I can't change the shape of eyeliner? I look crazy." (L4) • "I wouldn't like any colour. Lets try this one. Aw, I'm embarrassed. I can't see myself like this".(L4) • "So and this is the combination of looks. I really don't like the gloss." (L4) • "I'm curious, let's try this Rebel Chick Look" "This would work if I want to be a drag queen. Omg…"She makes funny faces and laughs (L4) • Pulls faces- "Lipstick colours are too strong." (L5) • "Lets try this gloss colour….Awww, ahahah, interesting color here. I think it's too much." (L5) • "Lets try this rebel style…. Ahahah I really don't like. I think it was better when i chose my own products."(L5) • Looks sceptical "Yeah. Not gonna do that" (L6) • "It is kind of funny to see myself extremely pink which would not ever happen, because I would look like a character from a cartoon" (L6) • Moves her head "Now I look like a lion" (L6) • Tries it [first time], puts the phone up to her face "Wow.[sounding surprised] Pretty lipstick" [sounds ironic] (L7) • Smile on her face "Omg. That does not look at all .. it looks really extreme" (L7) • "Oh. That looks really creepy" laughs (L7) • "None of these looks looks good on me" laughs (L7) • "No, I don't want to save this picture. Because honestly it looks very much like a clown" (L7) • Laughs, "It does look creepy" moves phone closer to face (L7) • "The lips are made well, but the eyes are extremely too much makeup" (L7) • "Here for example the blush is so extreme, that .. just look at how my cheeks" (L7) • "Then it always looks extreme, but on her it looks good, but on yourself it is too extreme" (L7) • "Otherwise you can see the products nicely on the women, and then it is super easy to buy them, as long as you won't end up looking like on these videos" laughs (L7)

	• "I found especially the colours extreme, I looked like a clown. I don't know it it's like that with other people as well.. Or if it was because of the light? I had the sun in my back." (L7) • Makes faces "But it doesn't work … that looks stupid"(L8) • Tries a new product "I don't think that looks good on me" laughs (L8) • Starts laughing - "That looks so stupid" (L8) • Chooses a new look "that looks really crappy" (L8) • "Yeah, this looks quite good. It looks as if I scalded myself" smiles (L8) • "For example, the blush, that looked completely horrible. Nobody would put their makeup on like that. [laughs]" (L8) • "But I think they don't have my colour." (L9) • "Now I am trying blush, but that looks horrible" (L9) • "Natural nude.. That is different. That looks better" Short pause "Maybe not" [laughter in voice] (L9) • Laughs "it is too much.. Or maybe it's just me, because I normally don't use it"; "Or maybe I should not have the highest intensity .. then..it might be better" (L9) • "Lipgloss!" "Aha! No doesn't make it better" (L9) • "In the beginning interesting. Then a bit frustrating. Because I couldn't really see the difference between the [chuckles] different look options. So it was always the same with the lipstick again. It always looked horrible… and .. maybe a bit .. maybe .. well, if you use it more times, it is probably easier, but .. you don't really have an overview." (L9) • "Funny. Because it is like carneval I think. [laughs] at least for me." (L9) • "Oh no!" Look at how that looks!" shows interviewer, sounding shocked "Oh my god. That does not work" (L10) • "Oh my god. Look at how I look!" shows interviewer "That does not work!" (L10) • "Honestly, this look… I look like a hooker on the street" shows interviewer (L10) • Tries eyeshadow "Now it gets even better" [irony] starts chuckling, then laughing Shows interviewer "I won't take this! But I do think it is also because of the lipstick" [referring to hooker simile] (L10) • "This latest look … is not the hit" (L10)
Looks good (1 participant)	• Moves head slightly up and down "Oh.. and now I can change the intensity.." "Aha!" "That does look good now" (L10) • "That does look quite dashing. .." (L10) • "Ah, now! Now I look good, I think." pulls kissy mouth (L10) • "I think in general it is fun, and it does look good now, maybe here" (L10) • "But if it will really look like this .. I doubt it. It does suit me, but if I now buy this strange purple lipstick, if it will really look this good .. I doubt it. I must say it does look good. You can also try good looks" (L10) • "I like the one from the blogger, you could go on the street like this" (L10) • Tries natural nude "I do like this look" moves face and mouth "This looks good" (L10)
Realism (4 participants)	• In reality I used to use this mascara, and the effect... it's pretty realistic.(L1) • I liked less the lips part, not realistic at all (L1) • "Let's go back to the eyeliner. There are different ways to put eyeliner on and here they offer just one type. For example what is this thing? Omg, this is not real."(L4) • "Ok so it kind of recognizes your face, but still it's not realistic, you need to try on cosmetics on your skin in order to have a better feeling."(L4) • "No, because I think it is wrong. What I can see, what they project on my face is not what the colour would really look like, because the colour will look different on my skin. So I think it is a lie. [laughs] basically. Because they just put a colour on top of a photo, but if the real colour touches my skin, it will look different. Or that is at least what I think. " (L9) • "But if it will really look like this .. I doubt it. It does suit me, but if I now buy this strange purple lipstick, if it will really look this good .. I doubt it. I must say it does look good. You can also try good looks" (L10)

e) Purchase intention

Unhelpful (2 participants)	• "No, because I think it is wrong. What I can see, what they project on my face is not what the colour would really look like, because the colour will look different on my skin. So I think it is a lie. [laughs] basically. Because they just put a colour on top of a photo, but if the real colour touches my skin, it will look different. Or that is at least what I think. " (L9) • "I don't know if it would help me make a decision, if the technology was better. Normally I go into the shop paint it onto my hand and then I see it. I look like a parrot after, but.. I don't think I would" (L9) • "I find it useful to go into the store and try it. And I think that will be better than this, even though I am really impressed with how well it applies it to my face" (L10)

3.1.3. Interactivity

a) Emotions

Amused (1 participant)	• Moves his hair more into his face; "When I have hair over my eye, it applies makeup to my hair" laughs (L8)
Annoyed (1 participant)	• "It's a bit difficult to understand how to use this tool. Why i can't change intensity and it constantly asks me to scan the face" - taps the phone and is a bit annoyed. (L1)
Curious (3 participants)	• Looks at the home page, tries to get an overview of the different features.(#1) • Surprise and curiosity on her face (I2) • Chooses one, slightly moves her head "Oh" [sounding intrigued] (L6)
Empowered (1 participant)	• "I rather felt like the app did what it wanted with me - definitely not empowered." (about interaction part) (L9)
Joyful (4 participants)	• It's fun to play around with it and try on different products and explore the application. (L3) • "I'm making faces" starts laughing (L6) • "I think I have tried something like this … two years ago. [keeps pulling faces] which did not work at all. So this is kind of funny" moves her mouth around in grimaces; tries different colours (L6) • "Oh, this is fun!" Moves head up and down (L6) • "I'm making faces" starts laughing (L6) • "It was fun. Mainly playing around" (L6) • "It's fun to try out" raises phone to her face (L7) • Studies app further "Well that looks quite nicely" chuckles (L8)
Playful (2 participants)	• Overall it's an interesting and entertaining experience. It's a fun app to play with and try on different products.(L5) • "It was fun. Mainly playing around" (L6)
Satisfied (1 participant)	• "Ahh! It even works when I open my mouth! That is good" (L9)
Surprised (4 participants)	• Makes a surprise face and smiles. Chose the Lipstick tab. "Aww, i want to try this one. Ok,it's weird!"(L1) • "Let's try the Eyeliner again. Woww, I like it." smiles and put the phone closer and turns her head right and left to see the effect (L1) • "You can share it. This blush is too intense. Again let's try a new product. Ok and then I can download the picture or put a filter on, so i can share it. Cool, this is very nice. (I2)

	• Turns head to pull hair out of eye “Oh! [surprise] It goes away if I turn my head!” (L6) • Pulls a face, opens her eyes excessively “Woah!” (L9)

b) User Experience

Technological quality (5 participants)	• The app wasn’t realistic at all. It offered few products, colours were fake and it wasn’t even easy to navigate it. (L4) • “I think I have tried something like this … two years ago. [keeps pulling faces] which did not work at all. So this is kind of funny” moves her mouth around in grimaces; tries different colours (L6) • “It colours my teeth too, but not that much” pulls her lips back (L6) • “I’ve never … had it being interactive like this. In that way it is interesting. That’s also why I kept making faces, because I wanted to know, how much can it follow? How much can I mess with it? .. which was quite a lot. If you look straight at it. “ (L6) • “But still cool, it is definitely better than other makeup apps, especially because it is with the moving face. Usually it takes a picture and then makeup is applied to the picture” scrolls through app (L7) • Tries on lipstick; Pulls a kissy mouth “Maybe it doesn’t recognize my lips” (L8) • Moves his hair more into his face; “When I have hair over my eye, it applies makeup to my hair” laughs (L8) • Moves her glasses up, away from her eyes and then back down; repeats several times; “I’m just checking if it changes if I take of my glasses, but it doesn’t” (L9) • “Ahh! It even works when I open my mouth! That is good” (L9)

c) User behavior

Explorative behaviour (4 participants)	• Explores the different parts of the app (#1) • Looks for the shopping chart. - “What if I want to buy it? Oh, here. Nice, just like a wishing list” (I2) • “Let’s try the Mascara. Aww nice. Let's try the eyeliner. Cool.” (L3) • It’s fun to play around with it and try on different products and explore the application.(L3) • “I’ve never … had it being interactive like this. In that way it is interesting. That’s also why I kept making faces, because I wanted to know, how much can it follow? How much can I mess with it? .. which was quite a lot. If you look straight at it. “ (L6)
Physical movement (10 participants)	• Moves the phone closer and further away to position the make up on the face. (L1) • “I used to use this mascara. I want to see the effect”. - Moves her face around puts her hair back her ears “It’s similar, nice”. (L1) • “Let’s try the Eyeliner again. Woww, I like it.” smiles and put the phone closer and turns her head right and left to see the effect (L1) • She puts the face closer to the screens to observe better the effect. (I2) • Taps in the middle - Discovers the picture and filters (I2) • Moves phone closer and further, widens the eye to observe changes (L3) • Makes critical expressions and pulls faces to understand the fit of the product. (L4) • Goes through the app and Scans her face. Pulls the phone closer and further for it to recognize it. (L5) • Straightens phone and makes her face long, opens eyes wide then squints (L6) • Pulls a face, mouth in wide grimace; Moves mouth in weird shapes (L6) • Pulls her hair back, opens her eyes widely (L6) • Opens eyes wide (L6) • Turns head repeatedly “Actually it is still on this eye [points to eye closer to camera] and then it just goes out [points away from her face]” (L6) • Laughs, “It does look creepy” moves phone closer to face (L7) • Turns her head, moves phone farther away (L7) • Raises phone to head level; Makes faces “But it doesn’t work … that looks stupid”(L8)

	• Moves her glasses up, away from her eyes and then back down; repeats several times; "I'm just checking if it changes if I take of my glasses, but it doesn't" (L9) • Pulls a face, opens mouth wide (L9) • Adjusts her glasses (L9) • Pulls a face, opens her eyes excessively "Woah!" (L9) • "I will try Peal passion" pulls a face, adjusts glasses (L9) • "Ah, now! Now I look good, I think." pulls kissy mouth (L10) • Raises phone to better inspect her face (L10)

d) Content

Concept of the app (4 participants)	• Discovers the picture and filters - "You can share it. This blush is too intense. Again let's try a new product. Ok and then I can download the picture or put a filter on, so i can share it. Cool, this is very nice. (I2) • "Lets try again to put on this lipstick and this colour. What does gloss intensity mean? How many times i put it down? (L4) • "I've never … had it being interactive like this" (L6) • "The only thing I didn't find that ideal, was the interaction with the app, even though it is a cool function." (L7)

3.1.4. Registration

a) Emotions

Joyful (1 participant)	• "I think I have tried something like this … two years ago. [keeps pulling faces] which did not work at all. So this is kind of funny" moves her mouth around in grimaces; tries different colours (L6)
Satisfied (1 participant)	• "Ahh! It even works when I open my mouth! That is good" (L9)
Surprised (1 participant)	• Turns head to pull hair out of eye "Oh! [surprise] It goes away if I turn my head!" (L6)

b) User Experience

Registration (3 participants)	• I liked the eyeliner, I think they were very precise. (L1) • Turns head to pull hair out of eye "Oh! [surprise] It goes away if I turn my head!" (#6) • Turns head repeatedly; "Actually it is still on this eye [points to eye closer to camera] and then it just goes out [points away from her face]" (L6) • Pulls a face, opens her eyes excessively "Woah!" (L9)
Technological quality (2 participants)	• "It colours my teeth too, but not that much" pulls her lips back (L6) • Moves her glasses up, away from her eyes and then back down; repeats several times; "I'm just checking if it changes if I take of my glasses, but it doesn't" (L9) • "Ahh! It even works when I open my mouth! That is good" (L9)

c) User behavior

Explorative behaviour (1 participant)	• "I've never … had it being interactive like this. In that way it is interesting. That's also why I kept making faces, because I wanted to know, how much can it follow? How much can I mess with it? .. which was quite a lot. If you look straight at it. " (L6)
Physical movement (2 participants)	• Turns head repeatedly "Actually it is still on this eye [points to eye closer to camera] and then it just goes out [points away from her face]" (L6) • Moves her glasses up, away from her eyes and then back down; repeats several times; "I'm just checking if it changes if I take of my glasses, but it doesn't" (L9)

3.1.5. Overall experience

a) Emotions

Amused (2 participants)	• Smiles, while trying out the app (L8) • "Honestly, this look… I look like a hooker on the street" shows interviewer (L10)
Annoyed (3 participants)	• "It scans again! It has some problems here.". Starting to get annoyed(L5) • "I need to clear this thing.. How do I.." frowns (L6) • "I took a picture.. That's not how you clear. Delete!" (L6) • Presses a button "Hey! [indignant] it disappeared.." (L9) • "In the beginning interesting. Then a bit frustrating. Because I couldn't really see the difference between the [chuckles] different look options. So it was always the same with the lipstick again. It always looked horrible… and .. maybe a bit .. maybe .. well, if you use it more times, it is probably easier, but .. you don't really have an overview." (L9) • Comment on design of the app: "If I look at things at the bottom, e.g. adjusting the colour, then I only see the top half of my face. Which is a bit annoying. And if I would hold the phone in a way that I would see my whole face, I can't see the adjustments any more, at least not properly." (L9)
Confused (4 participants)	• "It's a bit confusing in terms of … like when I want to go back to a blank slate, or what I'm saving and where it's saving it to" (L6) • "But now I first need to find how I can change the makeup", "Or is it only the one look that she is wearing at this point?" (L7) • Smiles, "It doesn't work. Oh no, it does. My lips are colourful" (L8) • Taps her face to start; "Is something happening already?" shows the interviewer *Interviewer: There should be makeup applied to your face* "Yes, I do believe I look like I am wearing makeup" (L10) • Scrolls through app "When I press this … Now I have one, two, three.. different things at the bottom.. Different Pictures?" shows interviewer "Are those filters?" "I don't need that" (L10) • "Favourites… Login required? Do I need that?" *No* (L10) • "Aha. First of, I think … [chuckles] that is not .. oh, now it's working" (L10)
Critical (5 participants)	• Looks attentively at the L'oreal icon.- "Is this from L'oreal? You don't even understand it from the app"(L4) • "Interesting [sounding sceptical], but it does work well that they find lips and eyes, which I am impressed with" (L7) • "Are these products they want to really sell?" (L8) • "But they don't tell me how to apply the makeup. So even if I buy these products for the look, I wouldn't know how to apply them and then it would look strange." (L9) • "But here, a more.." moves her head, scowls, chooses different colour (L10)

	• "It does look good now, but if … I mean I put on makeup every day, but that my eyes look like this … that happens very rarely, that's why I think it will be unlikely that will actually look like this … if I buy all of this" (L10) • "And if I take some filters, then it might look good here, but the problem is that will not be like I actually look like" (L10) • "I am pretty skeptical. It might be cool and you can probably try stuff, but in the end if the lipstick in combination with the blush will look like this on me .. I don't know" (L10) • "This latest look … is not the hit" (L10) • "It all looks good. But I have used mascara often by now, and it never looks like this. And it will also never look like this with me, also not if I buy it. I know that 180%. Unless this is fake lashes.. But it will not look like this with me" (L10) • "It could potentially work for lipstick. It is most likely that it will actually look like this" "If you already know the brand and know the consistency. It looks very matt, so either it will be more shiny when you actually apply it, or it will be this matt, but then it won't look like this, because it is more dry and it will enter the small folds of your lips more" (L10) • "It won't look like this in the end. I am a bit skeptical" (L10) • ".. yeah, but I personally think that I wouldn't use it to actually buy makeup, because I like to go to the store and see the products and maybe try them out over there, because I am a bit skeptical that it will actually look as it is here." (L10) • "as I said before maybe it works for certain products, for example lipsticks or lipglosses very well, but for other.. For eyeshadow, for example, I'm a bit skeptical, because it's also important that you know how to put it on." (L10)
Curious (3 participants)	• With curiosity looks at where the shopping bag. (I2) • "But it is only by L'Oreal? So I can only buy L'Oreal products?" (L7) • "And I could buy all of this here?" (L10)
Disappointed (4 participants)	• Dissatisfaction emerges from her look (L4) • Finds brown ones - "Yes! They have brownish ones"; Tries on "No that's not the colour" (L6) • "Then it always looks extreme, but on her it looks good, but on yourself it is too extreme" Raises phone back up to her face, "With her it look as if she isn't wearing any, but with me it looks as if I .. [laughter in voice] .. look. This is her, and this is me" (L7) • "But I think they don't have my colour." (L9) • "In the beginning interesting. Then a bit frustrating. Because I couldn't really see the difference between the [chuckles] different look options. So it was always the same with the lipstick again. It always looked horrible… and .. maybe a bit .. maybe .. well, if you use it more times, it is probably easier, but .. you don't really have an overview." (L9)
Joyful (6 participants)	• She tries the rebel chick combo, and smiles. (L1) • "Oh! [sounds surprised].. What is this? Ohhh! [sounding pleased] you have looks" Smiles (L6) • "Oh this is cool! [smiles] I'm having fun!" (L6) • "But it's fun" (L6) • "It's a fun way to test colours and stuff" (L6) • Moves her head "Now I look like a lion" (L6) • Finds lipstick function; Laughs (L7) • "On the picture it looks quite cool" (L7) • "Oh. That looks really creepy" laughs (L7) • "Ok. This is funny" (L7) • "Here for example the blush is so extreme, that .. just look at how my cheeks" (L7) • "Yeah, it's also quite fun, but .. it is not something spectacular [laughs]" (L8) • "I never tried that before, so it is funny" (L9) • "Funny. In the beginning interesting." [about experience] (L9) • "The experience was funny ("witzig")" (L9) • Laughs, [before realizing that AR] "Another video. Great" (L9) • "It was a quite good experience, because it was .. a new one. I haven't used the app before" (L10)

	• "I think in general it is fun, and it does look good now, maybe here" (L10) • "But I mean it was fun" (L10)
Satisfied (1 participant)	• Moves head slightly up and down "Oh.. and now I can change the intensity.." "Aha!" "That does look good now" (L10)
Surprised (6 participants)	• "So i want to try this lipstick. I click on it and try it. - Aww, ahaha. I don't like it. I want to change colour. - So Here i can change intensity and colour. Cool!" (I2) • Surprise and curiosity on her face (I2) • She's very negatively surprised. (L4) • "So i put mascara here. Nice"(L5) • Finds brown ones - "Yes! They have brownish ones" (L6) • "This is products, so not here - I'm going to go back" [Explanation from interviewer] "Oh!" sounding surprised, pulling face, smiling (L6) • "Interesting [sounding sceptical], but it does work well that they find lips and eyes, which I am impressed with" (L7) • "Wow! They have a lot of colours. And some look really crazy"; "Now I am trying all the colours" Takes her time to look at colours (L9)

b) User Experience

App navigation (10 participants)	• Start from the eye section (L1) • Scrolls among different types of eyeliners.(#1f) • "What if I want to remove the eyeliner? I want this one and black colour.(#1f) • Trying to understand how to navigate across the app (#1f) • "It's a bit difficult to understand how to use this tool. Why i can't change intensity and it constantly asks me to scan the face" - taps the phone and is a bit annoyed. (#1f) • Tries to understand where the shopping chart is? -"So how can I buy them? Ah, here. nice."(#1f) • Looks through all the products and information(#1f) • Navigates the app. Looks for how to delete the products.- "How do I take the lipstick off? Oh here,ok." (#1f) • it wasn't always easy to navigate through the app. (#1f) • It's a bit difficult to understand how to use it. I want to change intensity and every time it asks me to scan the face. (#1f) • Scrolls through the main page and focuses on the looks.- "What is this? Here they propose looks! Nice, I like it." (I2) • With curiosity looks at where the shopping bag. - "So I want these three products, nice" "Where is the shopping bag?" (L2) • So what is this "scan" a product? I can actually have access to more choices throw this system." (L2) • Annoyed and concentrated -"How can i go back to the first page? Can you help me?" (L2) • Looks at the products available and information tab.(L2) • Scrolls quickly through the app. - First main page and then single products. (L3) • "Can i give a first suggestion: It's better to put the face cosmetics at the top of the list and this are the first products you can try".(L3) • Scroll through the app and touches randomly features. ".....And here I can share a picture with my friends, nice"(L3) • Tries to scan it. - Has to do it twice. (L4) • The app goes back and has to scans again.(L4) • Looks for the trash basket. - She's figuring out how to eliminate products from the bin.(L4) • I didn't like anything, it was hard to navigate around and understand where to go and where to click without going back to the main menu(L4) • The app asks again to scan - "Omg, what happen? It's scans every time I update?"(L5)

	• Dives into the product info section and looks at info and filters - “I can filter products for style and colour, nice” (L5) • Looks where to conclude the shopping experience and changes her selection. (L5) • “How do I understand where is my shopping bag? Cause i Would like to eliminate products, it’s not clear. Personally i would look for a bin for example. “(L5) • But it crashes, it always askes me to scan. It’s annoying. And also if I want to go back it’s not that simple and clear. (L5) • The part where you can chose the products and respective information is well done. I like the filter structure(L5) • It’s not clear how to go to the shopping cart and eliminate products. For example I would look at a shopping bin not an arrow. (L5) • “This is products, so not here - I’m going to go back” [Explanation from interviewer] “Oh!” sounding surprised, pulling face, smiling (L6) • “How do I go back to what it … [smiles] Ok, I went out of the app” (L6) • “I need to clear this thing.. How do I..” frowns (L6) • “I took a picture.. That’s not how you clear. Delete!” (L6) • “It’s a bit confusing in terms of … like when I want to go back to a blank slate, or what I’m saving and where it’s saving it to” (L6) • “But it’s mainly that I found it a bit confusing to actually clear it. I think that is what I disliked the most. It’s not as intuitive as I would like it to be.” (L6) • “I‘ll just start at the top” “Even though I don’t know yet what is what” (L7) • “But now I first need to find how I can change the makeup”, “Or is it only the one look that she is wearing at this point?” (L7) • “Now that you know what this is for, it is quite manageable. Because you have the products right below, which she is wearing” (L7) • “Are there more than just those three looks?” (L7) • “Ah! Here I can vary stuff” (L7) • “Ok, so here is only lipsticks? Oh, no there is also mascara, and down there blush” (L7) • “Can I only buy the products here, or can I try them on” (L7) • Scrolls through app “Ah! Here are a lot of looks, so those were just the home looks before” (L7) • “Very nice overview, once you get familiar with it. At second glance definitely very neat” (L7) • “I liked that it was neat and clear to use, that you could find the products you liked instantly, and what products they are” (L7) • “I don’t know what I am doing here” (L8) • Starts laughing - “That looks so stupid” (L8) • “I found the app to be rather confusing [laughs]. So, I did not know what the icons meant, but once that got clear … I don’t know. The menu navigation was somehow a bit strange.” (L8) • “I didn’t like that you didn’t understand at first glance how it works.” (L8) • Presses a button “Hey! [indignant] it disappeared..” (L9) • “Or no.. what is it doing? I don’t know. Different things..in Different colours”; “Maybe it is a filter. I think it is a filter. Yes, must be a filter” keeps clicking (L9) • “well, if you use it more times, it is probably easier, but .. you don’t really have an overview.” (L9) • Taps her face to start; “Is something happening already?” shows the interviewer *Interviewer: There should be makeup applied to your face* “Yes, I do believe I look like I am wearing makeup” (L10) • Scrolls through app “When I press this … Now I have one, two, three.. different things at the bottom.. Different Pictures?” shows interviewer “Are those filters?” “I don’t need that” (L10)
Technological quality (9 participants)	• The app goes back to the initial page (#1f) • It doesn’t understand my skin/hair colour right? So it doesn’t customize on me,(#1f) • “Eyes. I really like this part, it’s so precise.”(L3) • “Let's try the lipstick, this fuchsia one. Wait, It doesn’t work”. (L4) • Some seconds pass in order to the app to recognise the face (L4)

	• "Let's try with the Lips. It's very good it recognizes my face. But it crashes when i want to change the intensity or colour."(L5) • The app constantly asks her to scan the face- "Uhm… It scan my face every now and then, and is not easy to go back."(L5) • "The part where you chose the products is very well done.(L5) • It's impressive the technology that it can recognise my face, lips and eyes. It makes it more real.(L5) • "It's fun to see what it does cause it's .. how it puts on stuff" (L6) • "Interesting [sounding sceptical], but it does work well that they find lips and eyes, which I am impressed with" (L7) • "It is interesting how well it works" (L7) • "But now something is wrong. It doesn't find my face now", moves phone slightly (L7) • "But I like that the eyes and mouth are recognized very well and also that the face is recognized pretty well, which looks more realistic than with other apps" (L7) • "Now it doesn't work again", sighs (L8) • "That did work quite well, apart from when my hair was hanging over my face or when … it didn't understand at first glance where the mouth was and then makeup was applied onto something else. But otherwise it did work quite well." (L8) • "You can't change the colour" (still in blogger look) (L9) • "Then a bit frustrating. Because I couldn't really see the difference between the [chuckles] different look options. So it was always the same with the lipstick again" (L9) • "And I didn't like that I couldn't see my whole face." (L9) • Comment on design of the app: "If I look at things at the bottom, e.g. adjusting the colour, then I only see the top half of my face. Which is a bit annoying. And if I would hold the phone in a way that I would see my whole face, I can't see the adjustments any more, at least not properly." (L9) • Moves her head, looking skeptical "I had the feeling that the blush is looking pink, even though I chose the brown one. I took the brown blush, and it did look brown at first, but now it looks pink. It looks strange" (L10) • "I'll go back and see if it is still brown. That was.. Ah, here.. No! [sounding indignant] It isn't. Why?" "It's back at pink" Tries to re-set, moves head slightly (L10) • "But I do think it is really well made" (L10) • "So I'm actually quite impressed with how well it worked" (L10) • "I liked the most the technical aspects, that it really put the makeup on the parts of my face where it really belongs. I mean, I was really impressed by that. .." (L10)

c) User behavior

Explorative behaviour (7 participants)	• Changes to the Nude Look. "This is more like me, let me see.(L4) • "So here I can share my pictures and put filters on it. Interesting." - Scrolls through the different filters and download the picture.(L5) • Tries to find a different colour "I want to try to find a brown one, because that is what I need to test anyway" (L6) • Scrolls through products "And then we add …" (L6) • "I looked at lipsticks before, and now i finally reset it so now I am just looking at what else I can find in here" (L6) • "Eyeshadow, what can you do?" (L6) • "It's a fun way to test colours and stuff" (L6) • "I think I have been testing a lot of stuff" laughs (L6) • Tries one more look "What can she do?" (L6) • "Are there more than just those three looks?" (L7) • Explores function (L7) • "Let's try a natural look" laughs (L7) • "I liked .. that you can look at pictures of different people wearing different styles." (L7) • "I choose brown .. hmm .. that is not brown" (L8) • "What else can I add?", adds blush (L8)

	• Tries several looks (L8) • Scrolls down the whole page, before trying it on "Because I always do that first, because then I can see what is on the page, before I press some buttons. Like try-it" (L9) • "Wow! They have a lot of colours. And some look really crazy"; "Now I am trying all the colours" Takes her time to look at colours (L9) • "And now I am in the lipstick option, and I will try all the colours again" chuckles (L9) • "Ahh! Try a look. Spring spirit.." (L9) • "I will try Peal passion" pulls a face, adjusts glasses (L9) • "Let me take…" inspects her face "Maybe …" chooses blush (L10) • "Alright, so now I tried Simone's look, now I'll look at latest products" (L10) • "What else can I do here?" Scrolls through app (L10) • "What can I do here?" "Oh! There are a lot more looks here" (L10)
Immersion (2 participants)	• Dives into the eye section. (L3) • Spends more time on the eye section then any other one. (L3) • "I did feel immersed, after all I saw it on me all the time." (L9)
Physical movement (4 participants)	• Puts the phone in front of herself and scans the face(#1f) • Moves the phone closer and further away from the face. (L4) • Goes to the lipstick section, scrolls up and down and then choose a product (L5) • Chooses new look, raises phone back up to her face (L7) • Tries one, raises phone to head level again (L7)

d) Content

Concept of the app (9 participants)	• "It's a very usefel application. I like makeup but i don't want to spend much on it. So first i want to see if that product fits me and when you go to a shop you can't always try everything. It's good that with the app you can try it first." (#1f) • I understand the overall idea, but then I think i wouldn't buy makeup online because i tried it here. I would still prefer to go to a make up shop and try it on me. (#1f) • I like I could try it on me and have an impression on how makeup looks (#1f) • Discovers the picture and filters - "You can share it. This blush is too intense. Again let's try a new product. Ok and then I can download the picture or put a filter on, so i can share it. Cool, this is very nice. (L2) • I liked the fact that I could feel how the makeup would look. I didn't like that there were very few products (L2) • I really like it. It's not really me, but I can imagine me better with this(L3) • Strange but also interesting. It was something new.(L3) • "Lets try again to put on this lipstick and this colour. What does gloss intensity mean? How many times i put it down? (L4) • "It automatically puts the products in the shopping bag, it's sneaky."(L4) • "How can you imagine people puts make up in this way? This is crazy. Now I understand why at the beginning you couldn't understand it was Loreal."(L4) • Overall i didn't like it I'm really into make ups, and I think that trying them it's a fundamental step in order to purchase them. The app wasn't realistic at all. It offered few products, colours were fake and it wasn't even easy to navigate it. (L4) • I saw better apps that put makeup on, but they were using pictures.(L4) • "If they use filters they should definitely add more product, otherwise it doesn't make sense"(L5) • "However the app is not completely realistic and easy to navigate". (L5) • "What i don't like is that i like to feel a product on my face and try it on and this is missing with the app experience. (L5) • [Interviewer: The whole app is AR] "Oh! That is cool!" (L6) • "I've never … had it being interactive like this" (L6)

	• "The idea is cool! But I think it needs to be improved. It does not look really realistic" "It is better than others, but still" (L7) • "At second glance definitely very neat .. otherwise a good idea, but I found the realisation of trying on the makeup not yet quite successful." (L7) • "it is not really innovative, because something like this already exists, and I believe they could .. it is definitely needs to be improved, but it is also good. So I wouldn't take that as a word - needs to be improved, because it would be a pity, because the app is also cool." (L7) • "The only thing I didn't find that ideal, was the interaction with the app, even though it is a cool function." (L7) • "I don't think I would scan the products in the shop to see how it would look on me. I'd rather look at pictures of other people how they put it on, but scanning as such I could see that, yes. A lot of people do it with other apps. I just wouldn't try it on myself." (L7) • "Yeah, it's also quite fun, but .. it is not something spectacular [laughs]" (L8) • "I think, if … Isa or someone can probably use it quite well to see something different, but actually it would be more fun to just put the makeup on yourself, and only then you see it properly, I think" (L8) • "Innovative… because it is something new. I have never seen that in the cosmetic industry before and I am quite familiar with that industry. So I think it is a new thing … what I actually really liked." (L10)
Missing content (8 participants)	• "This tool is just for the face right? You don't have it also for polish nail? It would be great if you could coordinate your lipstick colour with your nail polish nails for example. It would be cool to try it" (L2) • Is there also a concealer option? The only thing here is the blush. So you have descriptions and shades available. oh, ok, cool.(L2) • Also for Loreal, if you could have a description of what you have on your face it could be useful in order to share relevant information (L2) • It's nice you can share the pictures, because you spread Wom. It would also be nice if with the picture you know which products you used, so people can immediately know the type of product chosen. (L2) • It could be nice to have an app for nail polish where you can coordinate the colour together with the lipstick and see how it looks like.(L2) • "Lips. ok. You know what? I can't understand the difference among the products… I don't know how do they differ. Information should be more clear. As i'm not an expert I don't know the difference. (L3) • The part where you can chose the products and respective information is well done. I like the filter structure. However I would personally add more products, as it doesn't make much sense to have filters with such few products.(L5) • "It's a limited range of products. And I usually mix brands, I prefer some for different stuff." (L6) • "But … and there are relatively few looks, I think it was seven or eight different ones, that were already put together. Of course, you can try endlessly many yourself, which I didn't do" (L7) • "Why can I only choose so few products?" (L8) • "Yes [it would help with purchase], if there were more possibilities. There were only very specific sets of colours, and there should be more adjustment options, in which colours you do what" (L8) • Turns her head, "and what I find now … I don't know if I didn't do that yet, but I do need a foundation" "Because that is something that bothers me now with my face. Because if I would do it myself now, I would do that now. And it does make .." (L10) • "But you do need concealer and foundation in the app" Moves phone closer to face "I would find that important" (L10) • "I disliked .. the most that there is no foundation, so I actually think it is not a complete makeup, eventually" (L10)
Own abilities (3 participants)	• "and this would also assume that it puts it on as it should be and you're not limited to your own abilities [laughs]" (L6)

	• "But they don't tell me how to apply the makeup. So even if I buy these products for the look, I wouldn't know how to apply them and then it would look strange." (L9) • "It didn't help my understanding of the product. I know what product it is, but I don't know what it does. They didn't explain to me how I would use it." (L9) • "But I first need to apply it exactly like this …" moves head "that is my problem" (L10)
Product selection (6 participants)	• "So I would like this super eyeliner, wow, it's works great. It's realistic! (#1f) • Makes a surprise face and smiles. Chose the Lipstick tab. "Aww, i want to try this one. Ok,it's weird!"(#1f) • "Let's try the blush." Aww, too much intense" (#1f) • Tries to change intensity (#1f) • "I like the gloss,.. Ok looks good". (#1f) • "Gloss, why is it orange? Ok, I need to eliminate some products I guess. I was using a multilayers".(#1f) • I think the lipstick it's a bit intense, doesn't really fit me style. • Reads the information and news**.** • "Ok, so it gives you also the latest products".(L2) • "Let's go back to the eyeliner. There are different ways to put eyeliner on and here they offer just one type. For example what is this thing? Omg, this is not real."(L4) • "If I try the mascara. This looks like i put fake eyelashes".(L4) • "Nice there are different products. (L5) • "I liked the lipstick thing a lot. If we're just talking the different things you put on." (L6) • "I don't really get the difference between the looks" (L9) • [tries different look] "Maybe it looks a bit different" (L9) • "Natural nude.. That is different. That looks better" Short pause "Maybe not" [laughter in voice] (L9) • "I'm trying lipsticks again, but I am not very happy with the lipstick option" (L9) • "Best thing is that you can change the colours [laughs]" (L9)
Realism (7 participants)	• The app is not that much realistic however. When you really try make up on you the effect is quite different. It's useful but maybe for a first impression.(#1f) • In reality I used to use this mascara, and the effect it's pretty realistic.(#1f) • "Let's try the blush!" Has a surprise face. "This is not realistic" (#1f) • I liked the overall experience. I was surprised in seeing how the makeup would stick on my face. I also had one of the mascara offered and the effect it's pretty realistic.(L2) • "...Eyes done, Lips done. Let's try the Mascara. I really like it, it gives the idea" (L3) • Changes to the Nude Look. "This is more like me, let me see. • "This is not realistic at all."(L4) • "Let's try the nude look". "Ehm, ok! A little bit more realistic" (L4) • "If I try the mascara. This looks like i put fake eyelashes".(L4) • Ok so it kind of recognizes your face, but still it's not realistic, you need to try on cosmetics on your skin in order to have a better feeling."(L4) • What I didn't like is that the cosmetics are not realistic, not very precise.With this kind of apps, you already know that they don't work properly.(L4) • "The blush thing looked very, very fake… " (L6) • "And the blush just looked fake, for me. As soon as it was anything other than skin colour." (L6) • "And it doesn't look 100% natural of course" (L7) • "The idea is cool! But I think it needs to be improved. It does not look really realistic" "It is better than others, but still" (L7) • "But .. with the natural stuff, you do not look at all natural" (L7) • "But on yourself, when you press the try it button, it doesn't look like that" (L7) • "Better than with other apps, but still difficult, because it looks like too much makeup.. too extreme and to unnatural" (L7) • "I didn't like too much that it doesn't look natural" (L7) • "But I like that the eyes and mouth are recognized very well and also that the face is recognized pretty well, which looks more realistic than with other apps" (L7)

	• "It could potentially work for lipstick. It is most likely that it will actually look like this" (L10) • "It does look good now, but if … I mean I put on makeup every day, but that my eyes look like this … that happens very rarely, that's why I think it will be unlikely that will actually look like this … if I buy all of this" (L10) • "And if I take some filters, then it might look good here, but the problem is that will not be like I actually look like" (L10) • "I am pretty skeptical. It might be cool and you can probably try stuff, but in the end if the lipstick in combination with the blush will look like this on me .. I don't know" (L10) • "It all looks good. But I have used mascara often by now, and it never looks like this. And it will also never look like this with me, also not if I buy it. I know that 180%. Unless this is fake lashes.. But it will not look like this with me" (L10) • "It could potentially work for lipstick. It is most likely that it will actually look like this" "If you already know the brand and know the consistency. It looks very matt, so either it will be more shiny when you actually apply it, or it will be this matt, but then it won't look like this, because it is more dry and it will enter the small folds of your lips more" (L10) • "It won't look like this in the end. I am a bit skeptical" (L10)
Unusual application (3 participants)	• Also look at the eyeliners, they already prepared a shape for you, but people use eyelinears in different ways, how can you imagine I will put it this way? (L4) • Tries on blush; Holds her face still "Yeah! They do not add blush where I usually add blush." frowny-smiles (L6) • "They add makeup for a different type of eye than I have" keeps moving head up and down "Which is .. it looks fine, I just .." "They add makeup here" [points to her upper eyelid] "Where I don't put makeup - far up, because it looks funny. But fair enough" (L6) • ".. in a way, seeing as it is the standard way in which they put it on, which makes sense. But it's just for stuff like eyes, it's very .. depending on your shape of the eye depending on how you put on eyeshadows for instance" (L6) • "Intensity.. Ah! Ok, because it is a lot too much" adjusts (L9) • Looks at different eyeshadows; Chooses one, adjusts intensity "It's too much!" (L9) • Laughs "it is too much.. Or maybe it's just me, because I normally don't use it"; "Or maybe I should not have the highest intensity .. then..it might be better" (L9) • "I am wearing glasses. If you are wearing glasses, you have to put on makeup differently than without. And they did not take that into consideration. If I would put on makeup as extreme as they did and wore my glasses over it, it would look horrible, even more than without, because it looks even more extreme." (L9)

e) Purchase intention

Helpful (5 participants)	• "It's a fun way to test colours and stuff" (L6) • "I think it is a cool way to try products, if you don't want to go to a store" (L6) • "I also think it is nice that you can find the products instantly when you like the colour" (L7) • "Yes [it would help with purchase], if there were more possibilities." (L8) • "Useful information: I do know now, that I should not wear super pink lipstick, because it does not look good on me." (L9) • "as I said before maybe it works for certain products, for example lipsticks or lipglosses very well, but for other.. For eyeshadow, for example, I'm a bit skeptical, because it's also important that you know how to put it on." (L10)
Unhelpful (4 participants)	• I'm skeptical, because it's difficult to imagine a product through this tool. It's fun cause you play with it, but I can't understand how someone would buy cosmetics just after using this"(L4) • "If I try the mascara. This looks like i put fake eyelashes. Now, if I want to buy a mascara I need to try the brush. This does not incentive me to buy it."(L4) • "I would never use this app to shop. I need to go in the shop to buy cosmetics.(L4) • Overall i didn't like it I'm really into make ups, and I think that trying them it's a fundamental step in order to purchase them(L4)

	• Also look at the eyeliners, they already prepared a shape for you, but people use eyelinears in different ways, how can you imagine I will put it this way? This doesn't make me want to purchase it.(L4) • I would never downloaded this app. If i have to shop cosmetic products i want to go in a store so that i can try it on my skin, touch it.(L4) • Eyeliner you want to see how it writes and you try it on the hand. And the way it draws makes you want to buy it or not. So the app is not realistic and it's not enough to make you want to purchase a product(L4) • "I don't really think so. Maybe as inspiration, but .. and maybe rather for people who don't .. use makeup at all. But if you do … and I do. I use makeup pretty much always, and always rather similarly, and I think if you are a bit set in your ways , then you don't get new experiences out of the app. But if you don't do that and you want to see which type you are, or which colour suits you, then yes." (L7) • "No, because I think it is wrong. What I can see, what they project on my face is not what the colour would really look like, because the colour will look different on my skin. So I think it is a lie. [laughs] basically. Because they just put a colour on top of a photo, but if the real colour touches my skin, it will look different. Or that is at least what I think. " (L9) • "I don't think I would buy the brand, just because the app is from the brand. Or at least I don't think so" (L9) • "I don't know if it would help me make a decision, if the technology was better. Normally I go into the shop paint it onto my hand and then I see it. I look like a parrot after, but.. I don't think I would" (L9) • "It didn't help my understanding of the product. I know what product it is, but I don't know what it does. They didn't explain to me how I would use it." (L9) • "But if it will really look like this .. I doubt it. It does suit me, but if I now buy this strange purple lipstick, if it will really look this good .. I doubt it. I must say it does look good. You can also try good looks" (L10) • "It does look good now, but if … I mean I put on makeup every day, but that my eyes look like this … that happens very rarely, that's why I think it will be unlikely that will actually look like this … if I buy all of this" (L10) • "And if I take some filters, then it might look good here, but the problem is that will not be like I actually look like" (L10) • "I am pretty skeptical. It might be cool and you can probably try stuff, but in the end if the lipstick in combination with the blush will look like this on me .. I don't know" (L10) • "It all looks good. But I have used mascara often by now, and it never looks like this. And it will also never look like this with me, also not if I buy it. I know that 180%. Unless this is fake lashes.. But it will not look like this with me" (L10) • "I find it useful to go into the store and try it. And I think that will be better than this, even though I am really impressed with how well it applies it to my face" (L10) Augmentation • ".. yeah, but I personally think that I wouldn't use it to actually buy makeup, because I like to go to the store and see the products and maybe try them out over there, because I am a bit skeptical that it will actually look as it is here." (L10) • "as I said before maybe it works for certain products, for example lipsticks or lipglosses very well, but for other.. For eyeshadow, for example, I'm a bit skeptical, because it's also important that you know how to put it on." (L10)

3.2. IKEA

3.1.1. Code table

Global Theme	Organizing Theme	Basic Theme
Augmentation	Emotions	Amused
		Critical
		Joyful
		Playful
		Satisfied
		Surprised
	User Experience	App navigation
		Technological quality
	User Behavior	Explorative behaviour
		Physical movement
	Content	Concept of the app
		Product selection
		Realism
	Purchase intention	Helpful
		Unhelpful
Interactivity	Emotions	Annoyed
		Confused
		Curious
		Disappointed
		Joyful
		Playful
		Satisfied
		Surprised
	User Experience	App navigation
		Moving products
		Limits in augmentation
		Technological quality

	User Behavior	Explorative behaviour
		Immersion
		Physical movement
	Content	Concept of the app
		Realism
	Purchase intention	Helpful
		Unhelpful
Registration	Emotions	Amused
		Annoyed
		Confused
		Curious
		Disappointed
		Surprised
	User Experience	Registration
		Technological quality
	User Behavior	Explorative behaviour
		Immersion
		Physical movement
	Content	Realism
	Purchase intention	Unhelpful
Overall experience	Emotions	Amused
		Annoyed
		Bored
		Confused
		Critical
		Curious
		Disappointed
		Joyful
		Playful
		Satisfied

		Surprised
	User Experience	App navigation
		Limits in augmentation
		Technological quality
	User Behavior	Explorative behaviour
		Physical movement
	Content	Concept of the app
		Missing content
		Product selection
		Realism
	Purchase intention	Helpful
		Unhelpful

3.1.2. Augmentation

a) Emotions

Amused (2 participants)	• Moves to the sofa section - “Aww, this is interesting. It’s three sofas! It’s so big”- “It’s shows it to you if you open it completely.” - “They exit from here and come back from the other side” (I2) • After choosing first product, a chair, he laughs amused (I6)
Critical (4 participants)	• Tries to choose two different products to allocate in the space - “How can I put two product at the same time? Once I choose one the other disappears?” - She’s surprised and goes ahead trying to tap more products. (I2) • “I can put just one product at the time? It’s cool, but you loose the overall vision of the space.” (I2) • Choses a bed. “Why is this bed in the air? “It doesn’t go down on the floor?” .Moves the phone around (I5) • Criticises that it does not look realistic (I10) • “A bed?” looks around room with skeptical look (I11)
Joyful (8 participants)	• Stands up from the chair. And points the phone with different angles. Makes surprised and happy faces. (I1) • Choses at first a wardrobe and laughs as she put it on the table (I2) • She puts a box on the wall exactly where a guy is looking at. She laughs as by moving the box, it goes on the head of the guy. (I4) • “Let's try the wardrobe.”- She puts the phone at eye level and she turn the product upside down . She smiles.- “It’s not bad” (I5) • Smiles while placing chair, chuckles, “I do believe a pikachu just appeared” (I6) • Places it, smiling “Yes, this is brilliant” (I6) • Looks at space without phone, starts laughing (I6) • “So you can actually decorate your home”, chuckles, smiles (I7) • Chooses product “Oh”, rescales it (I7) • Chooses one [for first time], Exclamation of surprise “Oh! .. This is fun” Smiles (I7) • Sees product [first time]- big smile “Ahhhh” (I9)

	• Joyful: “that would assume that placing objects in my room makes me feel happy. - no not really” (I11)
Playful (4 participants)	• Smiles while placing chair, chuckles, “I do believe a pikachu just appeared” (I6) • Moves through room to place drawer in front of the door; “Now nobody can enter the door”, smiles (I6) • “Oh, now it is actually a miniature chair on the table”, smiles; “A good place to have a cat”, starts experimenting with placing the chair on table; “It is actually more of a hamster chair”, re-sizes it (I8) • Tries to place furniture on the interviewer; “There is a coathanger sort of in your nose right now”; “It looks like a piercing” (I8) • Stands up, goes to window “I am curious. Can I place it outside?”; Attempts to place furniture in the street; “I can make it look like there is a giant coathanger outside” (I8) • “What if I put it on the ceiling? Can I do that?” Tries to drag closet onto ceiling (I9) • Moves phone to look at interviewer; Smiles, “I can get it on ..” (I9) • “Hmm” rescales item; places a chair on shoulder of interviewer, smiles; “That’s what this app should be” (I11) • “Empowered? I could place something on your shoulder, that was pretty cool.” (I11)
Satisfied (2 participants)	• Places pink closet at wall, steps back to better see it with phone “Very nice” (I6) • Swivels chair to the side, picks a product, face shows signs of ‘aha’ thoughts (I7)
Surprised (4 participants)	• With this focus he tries other beds. He’s surprised that the image on the tab doesn’t match with the digital figure.(I1) • Studies the shelf in relation with the space. He is surprised. (I4) • Tries placing a bed - “Oh, it’s a bed” (I8) • “So if I were to buy a sofa..” Exclamation “uuu”, scrolls, picks sofa (I9) • “A closet! Uuu” (I9)

b) User Experience

App navigation (3 participants)	• He stops for a while on the bed section and observe the different products.(I1) • Choses at first a wardrobe and laughs as she put it on the table (I2) • “I can put just one product at the time? It’s cool, but you loose the overall vision of the space.” - Change of product and tries a small bin (I2) • Changes product. Goes back and forth among the product. -“Lets try this yellow shelf!” (I3)
Technological quality (2 participants)	• “It’s not that easy to put the objects around, even though overall I like it cause you understand how objects look in your room”. (I3) • Does it give you information about the furniture’s dimensions? The fact that you can make the furniture bigger/smaller as much as you want does not give you the effective dimension. For example with the app I can put the furniture right where I want it to be. However in reality it might not fit, so I created this nice picture, but then it’s not useful. They should do it with the effective dimensions. (I4)

c) User behavior

Explorative behaviour (6 participants)	• “Let’s try another one.” - Scrolls among the products until she choses a bin (I2) • Scrolls again through the different options - “This blue cube could go on the wall here” (I5) • “Lets choose something for the entrance” - “Entrance….Let's’ put this “cloth hanger”. Ok….Everything here is in the air” (I5) • “How would that look there?” - moves chair around, slight smile on face (I6) • “In terms of, if I found something I need … like if I wanted to be more interested in those furnitures … maybe … I actually see it as a better way, or more fun way to get to know more products.” (I8)

	• Swivels to face the ceiling; Tries to place product on the ceiling “If I recenter it on the ceiling..”; “It doesn’t recenter on the ceiling”; Moves back to normal position “It recenters here”; Moves phone to look at floor “Down on the floor? Oh, it can get down on the floor!”, resizes; Moves phone to face ceiling again “Why can’t I get it on the ceiling? No, i can’t get it on the ceiling” (I9) • Tisking sound “so now I want to choose a different one” (I11)
Physical movement (5 participants)	• She moves the phone up and down, and constantly taps the screens to re-size the chosen products.(I5) • Looks at space without phone, starts laughing (I6) • Enters product category, leans back to have more space “Ahh” (I7) • Swivels in chair to place product somewhere else (I7) • Swivels in chair to start, facing the room (I8) • Moves face closer to phone “Is that .. or is it .. it is animated!” (I8) • Scrolls through products; Looks up into his room to see what fits, looks back down, then up again (I11) • “A bed?” looks around room with skeptical look; Back down at phone “no” (I11)

d) Content

Concept of the app (6 participants)	• It’s awesome because you can picture the furniture in reality and not just in your mind, it’s actually useful.(I2) • The main problem is that it’s hard to calculate the real dimensions. Let me explain: i can make the chair bigger or smaller based on what I want to do, but it’s difficult to understand the real dimensions of the chair once you put it in the space. For example you can imagine this bed here like this, but we don’t know it’s effective dimension in reality, because it’s not this.The application should create the dimension based on reality not as we wanted to be(I3) • The thing i liked the most is that you are at home and you have to choose based on a catalog/different given options. So you put yourself where to put the furniture and you can do it from home directly.(I3) • My doubt here is that if I don’t have real dimension, i can put every object here, but they wouldn’t match with reality.(I4) • The thing I liked the most is that you can have a preview of what a space would look like. You can have an idea of how colours would kind of look like (i can imagine my mom, who cares a lot about colours)(I4) • “It was a creative idea to use that kind of interaction between the company and its products and the experience you need to have as a user, and how .. and bringing the product to people’s homes” (I7) • “I can kind of understand what it is for… to see what it looks like in the room” (I8) • “Ohhh… I get it. You do the AR, put it in your room and see how it looks and then it gives you this to buy it” “Ok, cool” (I9) • “I think you would have to project it as a hologram into the room. As long as it stays in the smartphone, it is not that different from using a picture. You still look up and down, and don’t really know how it would look like. You still need your imagination.” (L’Oreal I9)
Product selection (3 participants)	• The pictures of the furniture should resemble the product portrayed. For example if a bed is showed with the mattress, why don’t I see the mattress.(I1) • Choses a chair and places it realistically in the space. It makes it bigger or smaller depending on how far it is from her (I2) • Chooses product “Funky sofa … that is also animated” (I8)
Realism (6 participants)	• Plays around with the bin, putting it in non realistic positions and making it bigger or smaller until she is satisfied with the outcome. (I2) • He moves the phone around. “See? This is not the real dimension of the shelf? Probably it’s more like this?” (I3) • Re-sizes the shelf dimension taking as a benchmark the door in front of him. He tries other products. (I3)

	• I didn't like that i couldn't put more than one product and that the dimensions are not realistic. You can make products bigger/smaller as much as you want, but this is not helpful. You should do it based on real terms (I4) • Studies the shelf in relation with the space. He is surprised. - "The shelf doesn't move with you! You need to drag it." (I4) • Scrolls again through the different options. "This blue cube could go on the wall here" - "I can't understand, the dimensions are weird." (I5) • "It seems a little graphical" (I6) • "I am not sure if that is actual products, because they look very graphically. I mean they don't look well enough for me to believe that they are chairs. They look .. [laughs] like Pokemons - but as chairs, because.. It looks very imagery" (I6) • Rescales product "The thing is I have no clue how big this actually is", chuckles (I8) • "I can make it be as big as the whole room if I want to .. I can also make it tiny doll-size" Places product in the corner "which is maybe a bit troubling when I actually do a visualization of my house" (I8) • "This is actually weird. The other ones looked like a real bed or closet. But this table in particular looks very animated" (I8) • Re-scales "I can see, if I zoom in and out that it is probably way bigger than it is here" (I8) • "That looks animated as well. I guess it is animated. Not a big surprise", chuckles (I8) • "But I don't think it would be like a … I mean you only see… I mean it wouldn't be like that. When it comes to it. It's only like .. a projection. And .. the sizes … it is very hard to determine how big something actually is, because you can place it anywhere… like make small tables and chairs on the table here.. " (I8) • Tries to place it under TV - "that sort of looks like it is real" (I8) • Tries to place it with other chairs around table, moves his chair to better see (I8)

e) Purchase intention

Helpful (4 participants)	• I liked I could see furniture placed in the space. it could be useful if I want to buy a wardrobe and see it in my room before going to Ikea and buy it. (I1) • Looks at the product he already placed "so i can decorate my own room" (I7) • "I think it could be a good idea … app for people to have. Instead of going out. They can have the catalog and see if the furniture is something they would like in their home. So in that point I think it is a good app, but I think there is still something they could change." (I7) • "I think it could be a good idea … app for people to have. Instead of going out. They can have the catalog and see if the furniture is something they would like in their home. So in that point I think it is a good app, but I think there is still something they could change." (I7) • "I really liked, as I mentioned before, that you can take the product, choose which one you like and then if you did not like it you can take another product" (I7) • "In terms of, if I found something I need … like if I wanted to be more interested in those furnitures … maybe … I actually see it as a better way, or more fun way to get to know more products." (I8) • "What I liked the most is .. you could actually do a visualization.. Of a product, which is kind of cool." (I8) • "Yeah. I think it would. … Especially because furniture is so .. ah, like tedious … the process of like purchasing furniture is so tedious … like the objects, you'd have to go to the … the way you do it in the us is that you either go to the showroom or you go to the website. And then on the website, you can't really see what it looks like. It can be deceiving. And the showroom, it's like very inconvenient… compared to the website. So I feel like AR furniture shopping is pretty cool actually." (I9)
Unhelpful (2 participants)	• "Because there is some difference between when you dragged it around and the size when you scale it up and down. And that you can only have one product, so if you would like to see how they fit together it could be difficult .. to match" (I7) • "I can make it be as big as the whole room if I want to .. I can also make it tiny doll-size" Places product in the corner "which is maybe a bit troubling when I actually do a visualization of my house" (I8) • Tries to place it under TV - "that sort of looks like it is real" (I8)

	• "But I don't think it would be like a … I mean you only see… I mean it wouldn't be like that. When it comes to it. It's only like .. a projection. And .. the sizes … it is very hard to determine how big something actually is, because you can place it anywhere… like make small tables and chairs on the table here.. " (I8)

3.1.3. Interactivity

a) Emotions

Annoyed (1 participant)	• "I mean it was a little bit frustrating, cause I was trying like .. move it, and then I couldn't." (I9) • "I couldn't drag it and that was really annoying." (I9)
Confused (1 participant)	• Turns body to look at the big room; "Where did my chair go?"; Turns back, Astonishment: "Ohh! It stays in the same place" (I9) • Resizes it "Is this the back of the closet, is it the front of the closet? It is just transparent"; Taps on it "See, if I could interact with it, then I could …" (I9)
Curious (1 participant)	• Expressions of curiosity - "Aha - so I can do this with it", "What is this supposed to be?" (I10)
Disappointed (1 participant)	• Stretches phone really far from his body, then leans back with phone in hand; Repeats movement "It doesn't stay in the same position. The object is relative to the camera, not the room" Smiles "see. Now it is right next to the chair" [with arm outstretched] Leans back "Now it is more next to you - which is sad" (I11)
Joyful (8 participants)	• "It's so funny". He turns around the chair trying pieces of furniture (I1) • It's funny. It's like a game. Usually buying furniture might be boring, but through this app it makes it funny. (I1) • Stands up from the chair. And points the phone with different angles. Makes surprised and happy faces. (I1) • Choses at first a wardrobe and laughs as she put it on the table (I2) • "Let's try the wardrobe."- She puts the phone at eye level and she turn the product upside down . She smiles.- "It's not bad" (I5) • "How would that look there?" - moves chair around, slight smile on face (I6) • Rescales product, smiles, "It's funny at least" (I6) • Chooses product "Oh", rescales it (I7) • Rescales product - "Och" (I7) • "I think it was funny. It's a nice way to interact… with different things" (I8) • Resizes it "This is so cool" (I9) • Swivels again, pressing re-center button "Technology, wow!" (I9) • "I really liked looking at the furniture .. it's just like, I guess, mind-less shopping. Oh that looks like. That's cute… and just playing around.." (I9) • "cause it was fun to figure out how everything works and play around with it." (I11)
Playful (7 participants)	• Plays around with the bin, putting it in non realistic positions and making it bigger or smaller until she is satisfied with the outcome. (I2) • What I liked the most is that I could play around with the furniture, choose among different options and visualize things.(I5) • Places chair on top of a stack of paper (I6) • "I can make it be as big as the whole room if I want to .. I can also make it tiny doll-size" (I8)

	• Tries to place furniture on the interviewer; “There is a coathanger sort of in your nose right now”; “It looks like a piercing” (I8) • Stands up, goes to window “I am curious. Can I place it outside?”; Attempts to place furniture in the street; “I can make it look like there is a giant coathanger outside” (I8) • “Because you can play around. The thing is you just find the most weird thing you can in there .. I tried to do that …” (I8) • “What if I put it on the ceiling? Can I do that?” Tries to drag closet onto ceiling (I9) • Moves phone to look at interviewer; Smiles, “I can get it on ..” (I9) • “So I am like just playing around with the products.. And it was like … I could see how it would be like a nice game.” (I9) • Like in a computer game. (I10) • Humms to himself, moving the object “Now I am just messing around” (I11) • “Hmm” rescales item; places a chair on shoulder of interviewer, smiles; “That’s what this app should be” (I11) • “Empowered? I could place something on your shoulder, that was pretty cool.” (I11)
Satisfied (3 participants)	• Places pink closet at wall, steps back to better see it with phone “Very nice” (I6) • Swivels chair to the side, picks a product, face shows signs of ‘aha’ thoughts (I7) • “Ohhh..!” sounding pleased, smiling; Swivels back with body - “That is how you get it from one place to the other” (I9)
Surprised (8 participants)	• Scrolls through the app. He is surprised at first. (I1) • Nice! You can also save a picture. So I can chose if to put there a shelf or a table! Cool! (I3) • She turns with the phone and moves the objects around. She smiles while doing it (I4) • Chooses a couch - “It disappeared! Oh, here it is [after sweeping motion with phone]” (I6) • Moves body and phone around, “oh” (I7) • Finds re-center option “Oh”, leans forward towards the product (I8) • Rotates body and phone: “Oh it’s not there, but if I turn back it is there” (I8) • Resizes it “This is so cool” (I9) • Moves product, resizes it, rotates it “Oh, I can resize it” (I9) • Swivels his body to both sides “ohh” (I11)

b) User Experience

App navigation (3 participants)	• He stops for a while on the bed section and observe the different products.(I1) • Start looking at the different features and understanding how the app works(I2) • Changes product. Goes back and forth among the product. -“Lets try this yellow shelf!” (I3)
Moving products (4 participants)	• Keeps moving product “I like that I can move it around” (I8) • Moves chair around, “I’m just trying to get the hang of moving it” (I9) • Moves it “I am having trouble moving these products. I can resize them, that works fine. But i can’t like move it where i want to” (I9) • “I mean it was a little bit frustrating, cause I was trying like .. move it, and then I couldn’t.” (I9) • “I liked that you could rotate the furniture.” (I10) • Rescales and moves object, rotates it -> tries to put it where he wants it to be (in context to other furniture in the room) (I11) • “What I like the most is … how easy it is to move the object around, I would say” (I11)
Limits in augmentation (3 participants)	• Tries to choose two different products to allocate in the space - “How can I put two product at the same time? Once I choose one the other disappears?” - She’s surprised and goes ahead trying to tap more products. (I2) • “I can put just one product at the time? It’s cool, but you loose the overall vision of the space.” - Change of product and tries a small bin (I2)

	• Scrolls through further products - " ...are the models precise? "Can I add more than one? It would be nice if you could create your own room" (I4) • Taps different products and tries to select more than one. - "I actually would put more objects together? Do you have real sizes here?" (I4) • I didn't like that i couldn't put more than one product (I4) • What I liked the least and i think it could be improved, should be to insert more objects in the space, to better understand the overall picture. In a room you normally have more than just one piece of furniture. (I5)
Technological quality (8 participants)	• I wasn't satisfied with the quality of the app. As it doesn't look real as it's supposed to be. As you saw before the bed doesn't stick on the floor properly and couldn't turn it around as I wanted. Maybe they should work on it. (I1) • Moves the phone around, tapping the screen to reposition the object. - "It's stay where you put it" (I2) • I think it's nice, well design even if it could be better overall. (I2) • "It's not that easy to put the objects around, even though overall I like it cause you understand how objects look in your room". (I3) • Does it give you information about the furniture's dimensions? The fact that you can make the furniture bigger/smaller as much as you want does not give you the effective dimension. For example with the app I can put the furniture right where I want it to be. However in reality it might not fit, so I created this nice picture, but then it's not useful. They should do it with the effective dimensions. (I4) • "How do you drag it down" (I7) • "I have some difficulty … [moving the bed]" - "Ah" when figures out (I8) • "Sometimes it just gets bigger, when I just move it. But I guess that is ok" (I9) • Tapps on bed "I can't interact with this. Well that would be amazing" (I9) • Resizes it "Is this the back of the closet, is it the front of the closet? It is just transparent"; Taps on it "See, if I could interact with it, then I could …" (I9) • Rescales it "Now it is so small, I can't even re-center. Is it my fingers? Is it me" (I9) • "if I really liked a piece of furniture, the way it looked. Then I guess it wouldn't matter… if I couldn't drag it, or move it around or see exactly how it performed." (I9) • "It seems to me that as soon as I make an object really, really small.."; "Oh, ok. It's harder to use, but not impossible" (I11) • "If it is really small it is very hard to get it big again, or do anything with it" (I11)

c) User behavior

Explorative behaviour (6 participants)	• Choses a chair and places it realistically in the space. It makes it bigger or smaller depending on how far it is from her (I2) • "Let's try another one." - Scrolls among the products until she choses a bin (I2) • Try the bed in different positions in the space and from different angles. (I3) • Scrolls through the app. Choses a shelf and tries to put it in the space. (I4) • She puts a box on the wall exactly where a guy is looking at. She laughs as by moving the box, it goes on the head of the guy. (I4) • Scrolls again through the different options - "This blue cube could go on the wall here" (I5) • "In terms of, if I found something I need … like if I wanted to be more interested in those furnitures … maybe … I actually see it as a better way, or more fun way to get to know more products." (I8) • Swivels to face the ceiling; Tries to place product on the ceiling "If I recenter it on the ceiling.."; "It doesn't recenter on the ceiling"; Moves back to normal position "It recenters here"; Moves phone to look at floor "Down on the floor? Oh, it can get down on the floor!", resizes; Moves phone to face ceiling again "Why can't I get it on the ceiling? No, i can't get it on the ceiling" (I9)
Immersion (1 participant)	• He gets more and more into the app. Smiling at the different features he finds out.(I1)

Physical movement (11 participants)	• Moves the phone back and forth (I1) • He positions the products, taping the screen to change the dimension (I1) • Shares the phone with me, showing me what he found. (I1) • Explores the space with the phone. (I1) • “Can I stand up?” he turns around with the phone and tries furniture (I1) • The interviewee moves the phone closer and further from his eyes to better position the products.(I1) • She moves the phone close and far away to have a better understanding of the dimensions (I2) • Moves the phone around, tapping the screen to reposition the object. - “It’s stay where you put it” (I2) • Try the bed in different positions in the space and from different angles. (I3) • She turns with the phone and moves the objects around. She smiles while doing it - “It’s actually pretty realistic. Nice” (I4) • She moves the phone up and down, and constantly taps the screens to re-size the chosen products.(I5) • Moves around phone to find chair again (moved phone away from it while laughing) (I6) • Moves phone slightly from side to side (I6) • Moves around product (I6) • Stands up with phone in hand (I6) • Turns body around, placing product (I6) • Moves through room to place drawer in front of the door (I6) • Places pink closet at wall, steps back to better see it with phone “Very nice” (I6) • Moves body and phone sideways in sweeping motion (I6) • Leans back in his chair to better see product (I6) • Chooses a couch - “It disappeared! Oh, here it is [after sweeping motion with phone]” (I6) • Moves back with chair to better see couch; Swivels phone back and forth (I6) • Enters product category, leans back to have more space “Ahh” (I7) • Moves chair around, and rescales it (I7) • Moves body and phone around, “oh” (I7) • Moves around a bit with chair to have more space, rises phone up higher (I7) • Swivels in chair to place product somewhere else (I7) • Moves phone sideways, then tilts it back and forth (I7) • Turns back to table, first with phone facing table, then tilts phone upright (I7) • Tilts phone back and forth (I7) • Moves phone closer to face and back; Tilts phone sideways, up and down, forward and sideways, moves it around head (I7) • Swivels in chair to start, facing the room (I8) • Moves chair closer to where he projects the bed (I8) • Rotates body and phone: “Oh it’s not there, but if I turn back it is there” (I8) • Moves to the other side of the room (I8) • Moves face closer to phone “Is that .. or is it .. it is animated!” (I8) • Turns body to look at the big room (I9) • “Oh, I only get to do one thing at a time?”, keeps swivelling back and forth; Leans back in her chair “Ok. How do I get a whole room then?” (I9) • Swivels body “What if I moved here?”, presses re-center button (I9) • Moves in the room, walks around the product she placed (I10) • Goes back to comfortable position with phone pointing to floor; Chooses a new product: chair; Then raises phone again and moves it sideways (I11) • Swivels his body to both sides “ohh” (I11) • Moves phone back and forth between shoulder and his face “hmm” (I11) • Stretches phone really far from his body, then leans back with phone in hand; Repeats movement “It doesn’t stay in the same position. The object is relative to the camera, not the room” (I11)

d) Content

Concept of the app (5 participants)	• Nice! You can also save a picture. So I can chose if to put there a shelf or a table! Cool! (I3) • The thing i liked the most is that you are at home and you have to choose based on a catalog/different given options. So you put yourself where to put the furniture and you can do it from home directly.(I3) • "It was a creative idea to use that kind of interaction between the company and its products and the experience you need to have as a user, and how .. and bringing the product to people's homes" (I7) • "It's a nice way to interact… with different things. I think it's innovative… and I think it could be a funny way to so if something fits". (I8) • "There were just some part that were like .. yeah that could be better. But it was still cool to like try it out and just play around with it." (I9) • "If I couldn't interact with it, it would be stupid." (I11)
Realism (6 participants)	• Plays around with the bin, putting it in non realistic positions and making it bigger or smaller until she is satisfied with the outcome. (I2) • He moves the phone around. "See? This is not the real dimension of the shelf? Probably it's more like this?" (I3) • Re-sizes the shelf dimension taking as a benchmark the door in front of him. He tries other products. (I3) • I didn't like that i couldn't put more than one product and that the dimensions are not realistic. You can make products bigger/smaller as much as you want, but this is not helpful. You should do it based on real terms (I4) • Scrolls again through the different options. "This blue cube could go on the wall here" - "I can't understand, the dimensions are weird." (I5) • "Because there is some difference between when you dragged it around and the size when you scale it up and down." (I7) • Rescales product "The thing is I have no clue how big this actually is", chuckles (I8) • "I can make it be as big as the whole room if I want to .. I can also make it tiny doll-size" Places product in the corner "which is maybe a bit troubling when I actually do a visualization of my house" (I8) • Re-scales "I can see, if I zoom in and out that it is probably way bigger than it is here" (I8) • "But I don't think it would be like a … I mean you only see… I mean it wouldn't be like that. When it comes to it. It's only like .. a projection. And .. the sizes … it is very hard to determine how big something actually is, because you can place it anywhere… like make small tables and chairs on the table here.. " (I8)

e) Purchase intention

Helpful (3 participants)	• I liked I could see furniture placed in the space. it could be useful if I want to buy a wardrobe and see it in my room before going to Ikea and buy it. (I1) • "In terms of, if I found something I need … like if I wanted to be more interested in those furnitures … maybe … I actually see it as a better way, or more fun way to get to know more products." (I8) • "Yeah. I think it would. … Especially because furniture is so .. ah, like tedious … the process of like purchasing furniture is so tedious … like the objects, you'd have to go to the … the way you do it in the us is that you either go to the showroom or you go to the website. And then on the website, you can't really see what it looks like. It can be deceiving. And the showroom, it's like very inconvenient… compared to the website. So I feel like AR furniture shopping is pretty cool actually." (I9)
Unhelpful (2 participants)	• "Because there is some difference between when you dragged it around and the size when you scale it up and down. And that you can only have one product, so if you would like to see how they fit together it could be difficult .. to match" (I7) • "I can make it be as big as the whole room if I want to .. I can also make it tiny doll-size" Places product in the corner "which is maybe a bit troubling when I actually do a visualization of my house" (I8)

	• "But I don't think it would be like a … I mean you only see… I mean it wouldn't be like that. When it comes to it. It's only like .. a projection. And .. the sizes … it is very hard to determine how big something actually is, because you can place it anywhere… like make small tables and chairs on the table here.. " (I8)

3.1.4. Registration

a) Emotions

Amused (3 participants)	• Moves to the sofa section - "Aww, this is interesting. It's three sofas! It's so big"- "It's shows it to you if you open it completely." - "They exit from here and come back from the other side" (I2) • When answer is no [to question if you can stop product from jumping around], he chuckles and smiles, turns back to phone (I6) • Laughs ".. and someone is trying to crawl under it. Maybe it is that my hands shake" (I8)
Annoyed (1 participant)	• "And also the bouncing around… is … impossible to avoid I guess, but … a bit annoying." (I8)
Confused (2 participants)	• Turns body to look at the big room; "Where did my chair go?"; Turns back, Astonishment: "Ohh! It stays in the same place" (I9) • "I feel like it's flawed, because it doesn't stay there. When I move the phone [moves phone] it jiggles with it kind of"; "Or actually. Maybe that is just me not used to it", keeps moving phone slightly; "Cause it is throwing me off a bit"; "It's staying there, but is also kind of not" (I9) • Confusion whether product actually stands on the floor or is floating (I10)
Curious (1 participant)	• Turns back towards front "I wonder why it doesn't get the ceiling" (I9)
Disappointed (1 participant)	• Stretches phone really far from his body, then leans back with phone in hand; Repeats movement "It doesn't stay in the same position. The object is relative to the camera, not the room" Smiles "see. Now it is right next to the chair" [with arm outstretched] Leans back "Now it is more next to you - which is sad" (I11)
Surprised (4 participants)	• Excited exclamations ("Chair went away!"), when chair jumps of own accord (I6) • Chooses a couch - "It disappeared! Oh, here it is [after sweeping motion with phone]" (I6) • Rotates body and phone: "Oh it's not there, but if I turn back it is there" (I8) • Turns body to look at the big room; "Where did my chair go?"; Turns back, Astonishment: "Ohh! It stays in the same place" (I9) • Swivels his body to both sides "ohh" (I11)

b) User Experience

Registration (8 participants)	• I wasn't satisfied with the quality of the app. As it doesn't look real as it's supposed to be. As you saw before the bed doesn't stick on the floor properly and couldn't turn it around as I wanted. Maybe they should work on it. (I1) • "I'm trying to put the chair close to the wall. But it's a bit complicated. It's hard to calculate dimensions!". Pulls the ones closer to him trying to re-size the chair (I3) • Once you can put the furniture correctly in the space is actually nice.(I3)

	• Scrolls through the app. Choses a shelf and tries to put it in the space. -The shelf doesn't always stays perfectly in the place where he puts it. "It's a bit hard to handle!. The Shelf disappeared. Ok now it's back." (I4) • Choses a bed. "Why is this bed in the air? "It doesn't go down on the floor?" .Moves the phone around (I5) • Changes product. - "Let's put this bin here". - "It's so close. It's a bit in the air." (I5) • "It's doesn't stick to the ground."(I5) • "Lets choose something for the entrance" - "Entrance….Let's' put this "cloth hanger". Ok….Everything here is in the air" (I5) • Asks "Is there any way to stop them from jumping around?" (I6) • Turns away from door, [where he placed a product] "This is .. what is this?"; Turns body around, takes a few steps - "No, no, no - go back" (I6) • "Because you tend to overfocus on the thing, also because it jumps around a little bit. It doesn't stand still. You can't really place it and be like 'Stay there'. And then sort of watch the room." (I6) • "I really disliked that you couldn't… unless you took a picture, you couldn't ask the furniture to stay somewhere. It's probably hard with garbiscopes and stuff like that. But that made it.. that made me .. that made it apparent all the time that I was in Augmented Reality. I never had the illusion of .. there actually was furniture there, because the furniture was always … [indicates jumping up and down with his hand]. Soo.. I disliked that" (I6) • "It is a bit shaky. It's a good visualization of how it would be if there was an earthquake" (I8) • Laughs ".. and someone is trying to crawl under it. Maybe it is that my hands shake" (I8) • Observes how chair moves of own accord, when he moves "Ah now it is here" (I8) • "But seeing how everything jumped around, I could also see how that could be difficult" [about having a mini dollhouse] (I8) • "I actually think it would work better if it was still, like … because everything jumps around when you move the camera in and out, or you move position.. The app has replaced your furniture in the wall." (I8) • "And also the bouncing around… is … impossible to avoid I guess, but … a bit annoying." (I8) • Turns body to look at the big room; "Where did my chair go?"; Turns back, Astonishment: "Ohh! It stays in the same place" (I9) • "I feel like it's flawed, because it doesn't stay there. When I move the phone [moves phone] it jiggles with it kind of"; "Or actually. Maybe that is just me not used to it", keeps moving phone slightly; "Cause it is throwing me off a bit"; "It's staying there, but is also kind of not" (I9) • Stretches phone really far from his body, then leans back with phone in hand; Repeats movement "It doesn't stay in the same position. The object is relative to the camera, not the room" Smiles "see. Now it is right next to the chair" [with arm outstretched] Leans back "Now it is more next to you - which is sad" (I11) • Swivels body around "Maybe good because you can walk around and look.."; Moves arm sideways "which is interesting, because if you pan, it stays"; Moves arm back and forth "so only when you go further away it changes"; Swivels phone sideways "but it does have a panning option" (I11)
Technological quality (1 participant)	• Moves the phone around, tapping the screen to reposition the object. - "It's stay where you put it" (I2)

c) User behavior

Explorative behaviour (3 participants)	• She puts a box on the wall exactly where a guy is looking at. She laughs as by moving the box, it goes on the head of the guy. (I4) • Scrolls again through the different options - "This blue cube could go on the wall here" (I5) • "Exploring the technological quality of the app, actually made me explore the app more than I would originally" (I9)

Immersion (1 participant)	• "I really disliked that you couldn't… unless you took a picture, you couldn't ask the furniture to stay somewhere. It's probably hard with garbiscopes and stuff like that. But that made it.. that made me .. that made it apparent all the time that I was in Augmented Reality. I never had the illusion of .. there actually was furniture there, because the furniture was always … [indicates jumping up and down with his hand]. Soo.. I disliked that" (I6)
Physical movement (8 participants)	• Looks at whether the objects really move or not. (I1) • The interviewee moves the phone closer and further from his eyes to better position the products.(I1) • She moves the phone close and far away to have a better understanding of the dimensions (I2) • Moves the phone around, tapping the screen to reposition the object. - "It's stay where you put it" (I2) • Try the bed in different positions in the space and from different angles. (I3) • She turns with the phone and moves the objects around. She smiles while doing it - "It's actually pretty realistic. Nice" (I4) • Moves around phone to find chair again (moved phone away from it while laughing) (I6) • Moves phone slightly from side to side (I6) • Moves around product (I6) • Moves through room to place drawer in front of the door (I6) • Chooses a couch - "It disappeared! Oh, here it is [after sweeping motion with phone]" (I6) • Moves chair closer to where he projects the bed (I8) • Rotates body and phone: "Oh it's not there, but if I turn back it is there" (I8) • Moves to the other side of the room (I8) • Moves in the room, walks around the product she placed (I10) • Swivels his body to both sides "ohh" (I11) • Moves phone back and forth between shoulder and his face "hmm" (I11) • Stretches phone really far from his body, then leans back with phone in hand; Repeats movement "It doesn't stay in the same position. The object is relative to the camera, not the room" (I11)

d) Content

Realism (2 participants)	• Looks at whether the objects really move or not. (I1) • "It's doesn't stick to the ground."(I5)

e) Purchase intention

Unhelpful (1 participant)	• "Because you tend to overfocus on the thing, also because it jumps around a little bit. It doesn't stand still. You can't really place it and be like 'Stay there'. And then sort of watch the room." (I6)

3.1.5. Overall experience

a) Emotions

Amused (2 participants)	• "So now if I can find that very ugly couch again" - looking intrigued (I6) • rescales couch. "It looks like the rock one at CBS. Very ugly" Laughs (I6) • Starts scrolling through products again "What if I was looking at chandeliers?"; "Because I am rich enough to do that" starts laughing" (I9)
Annoyed (2 participants)	• "I'm actually getting more annoyed at these icons", keeps scrolling; "Some of them are so similar. They are just stick drawings and it is difficult to differentiate"; "They are cute, but maybe there is a better way to do that" (I9)

	• "Cause if I said it was frustrating, it would kind of mean that I had a bad experience overall. But I didn't" (I9) • Chooses lamp category - "but no lamp is coming up. Scheiße!" (I11)
Bored (3 participants)	• "It's cool that you can try new things, but it gets boring after a while" (I6) • "I think I explored the app. I am not bored with it yet" (I9) • "I don't feel like I experienced emotions during the experience" (I10) • "Maybe a bit boring, but it wasn't that bad." (I10)
Confused (2 participants)	• Chooses product which multiple product options next to each other: "Is it supposed to do this, where I just scroll…" (I7) • "Maybe they should write what the categories are about" (I7) • Looks at other products - "That's a drawer, that's not supposed to be with the beds" (I9) • "Which bed do I want. It's weird, because the nightstand throws me off" (I9) • "And why is it only giving me the drawers of the bed?" (I9) • Scrolls through the products "oh. Have the chairs changed?"; "I feel like there are more chair options" (I9)
Critical (4 participants)	• "It's not all the products in there. How do they select them? Do they change them?" (I7) • "Strange, just the drawers" (I9) • "Why is there no entrance?" (I9) • First exclamations of surprise, then of skepticism (I10) • Questions whether she would buy these products (I10) • Technological quality: "I was critical, because I felt it could be better. Because it is what I do in my P-Seminar" (I11)
Curious (5 participants)	• Website/Buy function: Asks why it doesn't work "Have they not linked it up yet?" (I6) • "So now if I can find that very ugly couch again" - looking intrigued (I6) • "Oh, so you can actually.. Oh nice" Looks intrigued (I7) • "And it's all from their own catalog?" (I7) • Goes back to other products "Now I am curious. Now I want to go back to those others …" [after realizing that products don't look real] (I8) • Reads "not available on the ikea website"; "Interesting" (I9) • Turns back towards front "I wonder why it doesn't get the ceiling" (I9) • "It's something different" (I10)
Disappointed (3 participants)	• Chooses new product, finds "I can only have one at a time" - no more smile on face (I6) • "Oh, I only get to do one thing at a time?", keeps swivelling back and forth; Leans back in her chair "Ok. How do I get a whole room then?" (I9) • Scrolling through products - "Ok, I guess I can't do then my own Barbie house" (I9) • "Oh.. so I am only looking at these one on one" sounding disappointed (I9) • Starts scrolling through products again "What if I was looking at chandeliers?"; "Because I am rich enough to do that" starts laughing; "Then I couldn't put it on the ceiling" sounds disappointed, keeps scrolling (I9) • Chooses a new product "Ok, no. I can't use two. Which is sad" (I11) • "I am disappointed there is no lighting" (I11)
Joyful (8 participants)	• Funny. I didn't feel annoyed or bored.(I1) • She's having fun and smiling.(I2) • "Ok lets change. She laughs. Choses a chair. " I'm creating a relax area, what do you think?!" (I5) • Let's put this chair here. Why not?! (I5) • "It's a fun little gimmick" (I6) • "But I mean it was fun and it was like .. yeah cool." (I6) • "It seems more like something I would at a dinner party be like "see what I made. Look at this. Now we can re-furnish the room" We'd have fun with it for five minutes." (I6)

	• Chuckles, “That is pretty cool” (I7) • Smiles “It’s like sims” (I7) • Keeps scrolling through products, “It’s really fun. It is like Sims kind of” (I7) • “But as a beginning .. the app I think it is pretty good. It is pretty fun.” (I7) • Scrolls through products “uuu.. These are funky chairs”; “Nice!” (I9) • “It was just .. it was like nice, because it was like virtual shopping” (I9) • Expresses it to be funny (“witzig”) (I10) • “Soo, I got it” laughs (I11) • Starts laughing to himself “the chair is not the prettiest one” (I11)
Playful (1 participant)	• Tries placing wardrobe to block the door (I8) • Moves chair to window to next room; Tries to place chair outside of room (I8) • “Now that I have explored all the options, I just want to push every single button” (I8)
Satisfied (3 participants)	• Finds product he likes “Nice big TV” (I6) • Finds a new product “This is nice” (I7) • Chooses a new product: table “Oh this looks nice” (I8)
Surprised (8 participants)	• “Look at this, It’s so cool”(I1) • “Wow! Look at this.” He put a sofa on the table in front of him (I1) • Surprise emerges when seeing no lamps in the tab (I5) • Looks at product categories “I don’t understand the categories here. This is closets and chairs.. [Exclamation] Children’s Furniture it says” (I6) • Exclaims excitedly: “Oh! There is two! It’s a set” (I6) • Chooses one [for first time], Exclamation of surprise “Oh! .. This is fun” Smiles (I7) • Chooses new product “Oh” [does this several times after choosing products] (I7) • Finds buy function “Oh! I believe this is a description of the product” (I8) • Tries to find information on product, Exclamation “Oh! Again, not available” (I8) • Picks bed, “Hey where did my chair go?” (I9) • “Oh wow! Nice drawer” (I9) • “Uhhh!! Children’s furniture! I am a child” (I9) • Exclaims “Oh, I saved a picture!” (I9) • Finds re-center option “Oh! It recenters it” (I9) • Finds buy function “Wow. Ohh.. It wants me to buy it… ohhh… ok, now I understand this app” (I9) • First exclamations of surprise, then of skepticism (I10) • [no reaction to product first appearing] Rescales product; “Wha! It’s gone!” smiles “ok, my first attempt failed” (I11) • “Oh!” slight surprise “So, it took an image, and I am going to show it to my mom”, smiles (I11) • Exclamation “oh! This one looks good”, straightens and chooses product (I11) • Finds re-center option “Oh! Recentered! Oh, ok!” (I11)

b) User Experience

App navigation (6 participants)	• Chooses at first to put a chair on the table (I1) • By scrolling through the products, choses the chair (I3) • Another thing to improve is the user friendliness of the app. It’s not that easy to put the objects in the space as where I want it to be. Generally i like the idea, as you can understand overall how the objects look in a defined space (I3) • I like that you can take a picture of the space. So that if you have to chose a furniture to pick you can confront different pictures and options (I3) • Quickly figures out where to find the products, moving around phone for camera function (I6) • Looks at product categories “I don’t understand the categories here. This is closets and chairs.. [Exclamation] Children’s Furniture it says” (I6)

	• "I think it was sort of intuitivy once you got the hang of it" (I6) • "it wasn't hard to use .. it's more .. so the intuition was easy. I found out how to use it quickly, but the finish wasn't that well" (I6) • "How do I go back?" (I7) • Chooses product which multiple product options next to each other: "Is it supposed to do this, where I just scroll…" (I7) • "Maybe they should write what the categories are about" (I7) • "Could you take more than one furniture at a time?" (I7) • "How do you drag it down" (I7) • "They all look quite similar, because they are all just stick drawings of furniture" [about category icons] (I9) • "How do I move it again? What are the instructions?"; Looks into instructions - "Oh, drag it. I have to drag it" (I9) • "I'm actually getting more annoyed at these icons", keeps scrolling; "Some of them are so similar. They are just stick drawings and it is difficult to differentiate"; "They are cute, but maybe there is a better way to do that" (I9) • Starts scrolling through the instructions "Seems simple enough" (I11)
Limits in augmentation (8 participants)	• It's a nice experience. However you can put just one object in the space and not more (I2) • Tries again to insert two products - "I can't put more than one object?! Right?" (I5) • Chooses new product, finds "I can only have one at a time" - no more smile on face (I6) • "you could only have one furniture there. You couldn't re-furnish the entire room. That made it less useful than I would imagine it to be." (I6) • "I really disliked that there was not multiple furniture" (I6) • Picks a new product "When I pick a new thing, the old one disappears" "So I can only have one thing" (I7) • Only one product: "So you can't really use it as an app to redecorate stuff, you can only see how one product fits into it for example" (I7) • "And that you can only have one product, so if you would like to see how they fit together it could be difficult .. to match" (I7) • Chooses another product: bed - "Ah, you cannot have both" (I8) • Tries to place table next to bed "that removed the wardrobe" (I8) • Tries to find if he can manage to place more than just one product; "It would be really cool if I could make my own miniature home on this table" (I8) • "If I could have two things at the same time, I could make a little dollhouse, which I thought could be really cool" (I8) • "But, where I think it would be really interesting was .. you could like go into an empty apartment and create your own room. Which is not possible, so that's kind of a dislike" (I8) • Picks bed, "Hey where did my chair go?" (I9) • "Oh, I only get to do one thing at a time?", keeps swivelling back and forth; Leans back in her chair "Ok. How do I get a whole room then?" (I9) • Scrolling through products - "Ok, I guess I can't do then my own Barbie house" (I9) • "Oh.. so I am only looking at these one on one" sounding disappointed (I9) • "I feel like there is no point moving through the room, because if I pick one the other goes away" (I9) • "What I didn't like was that you can't put down one thing and then add another." (I10) • "Ahh, now the other image disappeared. So now I can't place things next to each other, can I?" (I11) • Chooses a new product "Ok, no. I can't use two. Which is sad" (I11) • "you have to be able to put more than one object together, because right now I can only look at a desk, but maybe I want to buy a chair too. And then it gets really hard to compare two objects. But it's equally hard somewhere else…" (I11) • "I disliked the most that you can't put two objects next to each other." (I11)
Technological quality	• Scrolls through further products - " ...are the models precise?(I4)

(8 participants)	• I think the quality it's good, if you point the camera to a wide open space the feeling is more realistics. If you select a piece of furniture to close to where you are, then I would say it's less(I5) • Tries to rescale "It is not always responsive" (I6) • "And this is really an app, not a beta version?" (I7) • Annoyance at jumping out of FAQ function; Finds FAQ again (I8) • Focuses phone on his bag on the table "I realize now my bag is out of focus, but the product isn't" (I8) • Swivels to face the ceiling; Tries to place product on the ceiling "If I recenter it on the ceiling.."; "It doesn't recenter on the ceiling"; Moves back to normal position "It recenters here"; Moves phone to look at floor "Down on the floor? Oh, it can get down on the floor!", resizes; Moves phone to face ceiling again "Why can't I get it on the ceiling? No, i can't get it on the ceiling" (I9) • "The technical quality was quite good, but not optimal" (I10) • "Like the app felt smooth, but .." (I11)

c) User behavior

Explorative behaviour (7 participants)	• He scrolls through the different product, and takes time in deciding which to try.(I1) • She explores the app, typing different sections and collecting more info(I4) • Let's put this chair here. Why not?! (I5) • Switches to the bed. - " Let's put this bed in front of the elevator." (I5) • "Nice! Why not a baby bed here. She scrolls around more products. "Ok I think I got the concept".(I5) • "Can I change the colour?"; Tries to find option, chooses different product "That would be better, yes", moves body to better see (I6) • Walks back to chair "What else do we have?" leaning forward to rest on table (I6) • "There is a lot of things" (I6) • Scrolls through different categories, exploring (I6) • Reads instructions "how to use this feature …"; Finds the 'use ikea catalog option' - expresses wish to try that too; Explores FAQ function (I6) • "It's cool that you can try new things, but it gets boring after a while" (I6) • "I really want to find the perfect product" (I7) • Keeps scrolling through products, "It's really fun. It is like Sims kind of" (I7) • Keeps scrolling through products [a lot, for very long times] (I7) • Explores other category (I8) • "Let's see what this is" choses a product "Ohh.. a neat chair" (I8) • Tries to find information on product, Exclamation "Oh! Again, not available" (I8) • "Now that I have explored all the options, I just want to push every single button" (I8) • Keeps scrolling through products [does that repeatedly and for a long time] (I9) • "Uhhh!! Children's furniture! I am a child" (I9) • "There are so many categories", scrolling (I9) • "So if I were to buy a sofa.." (I9) • "I am just looking at all these products."; Scrolls through products, sings to herself (I9) • Scrolls through products "uuu.. These are funky chairs"; "Nice!"; Keeps scrolling - "Ok some of these are not work desks" (I9)
Physical movement (7 participants)	• He tries different products. Turning on his chair and playing (I1) • "It's so funny". He turns around the chair trying pieces of furniture (I1) • Stands up from the chair. And points the phone with different angles. Makes surprised and happy faces. (I1) • He moves the phone back and forth. He's very focus. (I3) • Moves the phone around him as well. (I3) • Re-sizes the bed, by tapping on the screen. (I3) • Moves the phone closer to his eyes. (I3)

	• Goes for the bed now. She looks intently to the phone and taps the screen to re dimension the bed in the space. (I4) • Moves the phone closer to observe the screen. (I4) • "Let's try the wardrobe." - She puts the phone at eye level and she turn the product upside down (I5) • Moves the phone further away from her. - "Lets try a bit further If I put it further it actually stays on the ground. Maybe before I was pointing to close" (I5) • Turns around phone (so it's horizontal) (I7) • "I feel like there is no point moving through the room, because if I pick one the other goes away" (I9) • Raises up phone to face height; Chooses product (I11) • Bends back down to scroll through products; Chooses a product, straightens again (I11)

d) Content

Concept of the app (9 participants)	• It's awesome because you can picture the furniture in reality and not just in your mind, it's actually useful.(I2) • When I think at the app i think of "Home". Also because my apartment is all ikea, so it's easy. (I2) • It's awesome because you can picture the furniture in reality and not just in your mind, it's actually useful.(I2) • When I think at the app i think of "Home". Also because my apartment is all ikea, so it's easy. (I2) • Nice! You can also save a picture. So I can chose if to put there a shelf or a table! Cool! (I3) • The main problem is that it's hard to calculate the real dimensions. Let me explain: i can make the chair bigger or smaller based on what I want to do, but it's difficult to understand the real dimensions of the chair once you put it in the space. For example you can imagine this bed here like this, but we don't know it's effective dimension in reality, because it's not this.The application should create the dimension based on reality not as we wanted to be(I3) • When I think of this app I think of "Immediate". You can compare different options from home without necessarily go out, it's fast and instinctive. You do everything at the moment where you are (I3) • Nice! You can also save a picture. So I can chose if to put there a shelf or a table! Cool! (I3) • The main problem is that it's hard to calculate the real dimensions. Let me explain: i can make the chair bigger or smaller based on what I want to do, but it's difficult to understand the real dimensions of the chair once you put it in the space. For example you can imagine this bed here like this, but we don't know it's effective dimension in reality, because it's not this.The application should create the dimension based on reality not as we wanted to be(I3) • The thing i liked the most is that you are at home and you have to choose based on a catalog/different given options. So you put yourself where to put the furniture and you can do it from home directly.(I3) • When I think of this app I think of "Immediate". You can compare different options from home without necessarily go out, it's fast and instinctive. You do everything at the moment where you are (I3) • The thing i liked the most is that you are at home and you have to choose based on a catalog/different given options. So you put yourself where to put the furniture and you can do it from home directly.(I3) • My doubt here is that if I don't have real dimension, i can put every object here, but they wouldn't match with reality.(I4) • Overall I found it interesting. I never used such an app. I think it's nice that you could have a first snapshot of what a piece of furniture would look like in a room(I4) • I think the app is Useful. I think it should be for older people. I mean now I'm not in an age where I look for furniture, but for people older than me it could work.

	• The thing I liked the most is that you can have a preview of what a space would look like. You can have an idea of how colours would kind of look like (i can imagine my mom, who cares a lot about colours)(I4) • My doubt here is that if I don't have real dimension, i can put every object here, but they wouldn't match with reality.(I4) • Overall I found it interesting. I never used such an app. I think it's nice that you could have a first snapshot of what a piece of furniture would look like in a room(I4) • I think the app is Useful. I think it should be for older people. I mean now I'm not in an age where I look for furniture, but for people older than me it could work. • The thing I liked the most is that you can have a preview of what a space would look like. You can have an idea of how colours would kind of look like (i can imagine my mom, who cares a lot about colours)(I4) • I liked the experience and the idea, By using the app you can actually make a project. I appreciated that I could see the furniture in the room. (4) • "I liked the idea of the catalog, if it works. That is super-cool. I mean then I'm starting to see potential in it" (I6) • "It was a creative idea to use that kind of interaction between the company and its products and the experience you need to have as a user, and how .. and bringing the product to people's homes" (I7) • "I think it could be a good idea … app for people to have. Instead of going out. They can have the catalog and see if the furniture is something they would like in their home. So in that point I think it is a good app, but I think there is still something they could change." (I7) • "But as a beginning .. the app I think it is pretty good. It is pretty fun." (I7) • "Because these kind of apps are the future. I think we will see more and more with this kind of interaction. I think it works. And it's a good way for companies to show what they can do." (I7) • "I really liked, as I mentioned before, that you can take the product, choose which one you like and then if you did not like it you can take another product" (I7) • "I can kind of understand what it is for… to see what it looks like in the room" (I8) • "It's a nice way to interact… with different things. I think it's innovative… and I think it could be a funny way to so if something fits". (I8) • "Ohhh… I get it. You do the AR, put it in your room and see how it looks and then it gives you this to buy it" "Ok, cool" (I9) • "There were just some part that were like .. yeah that could be better. But it was still cool to like try it out and just play around with it." (I9) • "I think you would have to project it as a hologram into the room. As long as it stays in the smartphone, it is not that different from using a picture. You still look up and down, and don't really know how it would like like. You still need your imagination." (L'Oreal I9) • "It wasn't too hard to figure out. The only thing that took me a while.. five seconds longer than the rest is to figure out where to get the furniture from in the first place, because after the tutorial you can do blablabla, it didn't show you where to get your furniture." (I11) • The app might get a lot better by the time he buys furniture, then it would be cool. (I11) • "If I couldn't interact with it, it would be stupid." (I11)
Missing content (6 participants)	• He wants to try the lamp, but he can't find it. "Why is there no lamp if I click on the tab?" (I1) • I didn't like I couldn't see the lamp options, and they were a tab in the app.(I1) • Surprise emerges when seeing no lamps in the tab - "I like lamps. Lets try it. Umh..The lamp tab doesn't have anything?" (I5) • Website/Buy function: Asks why it doesn't work "Have they not linked it up yet?" (I6) • "So they have no lighting" (I7) • "It's not all the products in there. How do they select them? Do they change them?" (I7) • "I'm not sure I liked all the products. Because I was not sure if they had all the products. They only had two couches. Maybe they should update it, or .. have even more. But I can also see that it has disadvantages with IKEA that has so many products, to have all of it in there." (I7) • "they cannot show it all, but it is something they can work on" (I7) • There is nothing in lighting. Well that is a deceptive category", keeps scrolling (I9) • Chooses lamp category - "but no lamp is coming up. Scheiße!" (I11)

	• "The app did not have that many options. It only had 10 chairs.." (I11)
Product selection (8 participants)	• "There is a mismatch between the icon shown here and what is augmented. - Why can't I see the pillow and the mattresses for example?" (I1) • With this focus he tries other beds. He's surprised that the image on the tab doesn't match with the digital figure. (I1) • They should add more furnitures, too few.(I1) • The pictures of the furniture should resemble the product portrayed. For example if a bed is showed with the mattress, why don't I see the mattress.(I1) • Regarding valuable information, I didn't know the length or the weight of the product. Just seeing the product in the space is not enough. (I1) • Choses a chair and places it realistically in the space. It makes it bigger or smaller depending on how far it is from her (I2) • Moves to the sofa section - "Aww, this is interesting. It's three sofas! It's so big"- "It's shows it to you if you open it completely." - "They exit from here and come back from the other side" (I2) • Plays around with the bin, putting it in non realistic positions and making it bigger or smaller until she is satisfied with the outcome. (I2) • As for information, I think the other tool, the ikea store, is a better tool to collect information, as it gives all the product's information. (I2) • "I'm trying to figure out but I can't understand the dimensions of the chair in reality!" (I3) • "Look at this bed...You see the main problem here is that we can't really understand the dimensions of this bed here?" (I3) • Overall I think this are my impressions. "Aw, wait lets try this bookshelf with the mirror? Aw it's not a mirror!" (I3) • taps the screens to re-size the chosen products. (I5) • rescales couch. "It looks like the rock one at CBS. Very ugly" Laughs (I6) • Exclaims excitedly [after choosing red couch]: "Oh! There is two! It's a set" (I6) • "It opens! There is the regular one and then there is the open one" (I6) • "Let's see what this is" choses a product "Ohh.. a neat chair" (I8) • Chooses new product: dinning room table "elegant table" (I8) • Chooses product "Funky sofa … that is also animated" (I8) • "Interesting category", still scrolling (I9) • Scrolls through products "uuu.. These are funky chairs" (I9) • "Ok, that is actually kind of ugly", Chooses a product (I9) • "Oh wow! Nice drawer" (I9) • "I really liked looking at the furniture .. it's just like, I guess, mind-less shopping. Oh that looks like. That's cute… and just playing around.." (I9) • Finds buy-option "Nooo!! [pulls a face] What the fuck?" starts laughing "a little bit too expensive" (I11) • "Let's take a cheap chair this time. I think it will be better" chuckles (I11) • Starts laughing to himself "the chair is not the prettiest one" (I11) • Crouches back down, looks at price "Woah! Alter!" (I11)
Realism (8 participants)	• Looks at whether the objects really move or not. (I1) • The thing I liked the most is that you can understand how it looks in reality.(I2) • Plays around with the bin, putting it in non realistic positions and making it bigger or smaller until she is satisfied with the outcome. (I2) • "Look at this bed...You see the main problem here is that we can't really understand the dimensions of this bed here?" (I3) • He moves the phone around. "See? This is not the real dimension of the shelf? Probably it's more like this?" (I3) • Re-sizes the shelf dimension taking as a benchmark the door in front of him. He tries other products. (I3) • The thing i liked the least is that even if you can compare different things, in reality then it's different. Dimensions and colours are different, so you can't make a realistic and true image of how it would look in reality. (I3)

	• I didn't like that i couldn't put more than one product and that the dimensions are not realistic. You can make products bigger/smaller as much as you want, but this is not helpful. You should do it based on real terms (I4) • Studies the shelf in relation with the space. He is surprised. - "The shelf doesn't move with you! You need to drag it." (I4) • She turns with the phone and moves the objects around. She smiles while doing it • "It's actually pretty realistic. Nice" (I4) • "I think it's realistic, but colours are a bit fake"(I4) • Changes product. - "Let's put this bin here". - "It's so close. It's a bit in the air." (I5) • "It's doesn't stick to the ground."(I5) • Scrolls again through the different options. "This blue cube could go on the wall here" - "I can't understand, the dimensions are weird." (I5) • "It seems a little graphical" (I6) • "I am not sure if that is actual products, because they look very graphically. I mean they don't look well enough for me to believe that they are chairs. They look .. [laughs] like Pokemons - but as chairs, because.. It looks very imagery" (I6) • "Because there is some difference between when you dragged it around and the size when you scale it up and down." (I7) • Rescales product "The thing is I have no clue how big this actually is", chuckles (I8) • "I can make it be as big as the whole room if I want to .. I can also make it tiny doll-size" Places product in the corner "which is maybe a bit troubling when I actually do a visualization of my house" (I8) • "This is actually weird. The other ones looked like a real bed or closet. But this table in particular looks very animated" (I8) • Tries to place it under TV - "that sort of looks like it is real" (I8) • Tries to place it with other chairs around table, moves his chair to better see (I8) • Chooses product "Funky sofa … that is also animated" Chooses other product "This doesn't look animated. Well it does, but not that much" Turns body back to room "If you take it over here. It doesn't look like it. It sort of fits its natural setting" (I8) • Re-scales "I can see, if I zoom in and out that it is probably way bigger than it is here" (I8) • "That looks animated as well. I guess it is animated. Not a big surprise", chuckles (I8) • "But I don't think it would be like a … I mean you only see… I mean it wouldn't be like that. When it comes to it. It's only like .. a projection. And .. the sizes … it is very hard to determine how big something actually is, because you can place it anywhere… like make small tables and chairs on the table here.. " (I8) • Criticises that it does not look realistic (I10) • "Maybe quite helpful to see the furniture for once… but I don't think it is very realistic" (I10)

e) Purchase intention

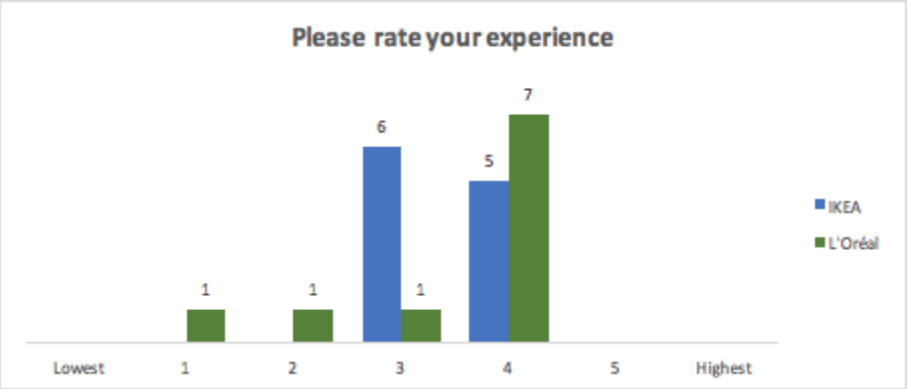
Helpful (7 participants)	• I liked I could see furniture placed in the space. it could be useful if I want to buy a wardrobe and see it in my room before going to Ikea and buy it. (I1) • The app is a useful tool to make a purchase decision. I never used the app before but I used a program on the computer, which is kind of the same. You don't upload a picture, but you can draw the space you have which is what I was used to do, as i used to do it in Autocad). So in this ikea program i put my rooms measures. The idea behind it is that the more visual it is the better in order to visualize the final effect. (I2) • As I didn't have a purpose to buy something, and as I wasn't looking for anything at the moment. At this moment it's not helpful. But if i'm looking for something, then i think it might be helpful to use the app and it can help in making a purchase decision. (I2) • "It would be nice to have a couch here" (I6) • "I really want to find the perfect product" (I7) • "It could be really cool to have. Is it an app I can download?" (I7) • Looks at the product he already placed "so i can decorate my own room" (I7) • "I think it could be a good idea … app for people to have. Instead of going out. They can have the catalog and see if the furniture is something they would like in their home. So in that point I think it is a good app, but I think there is still something they could change." (I7)

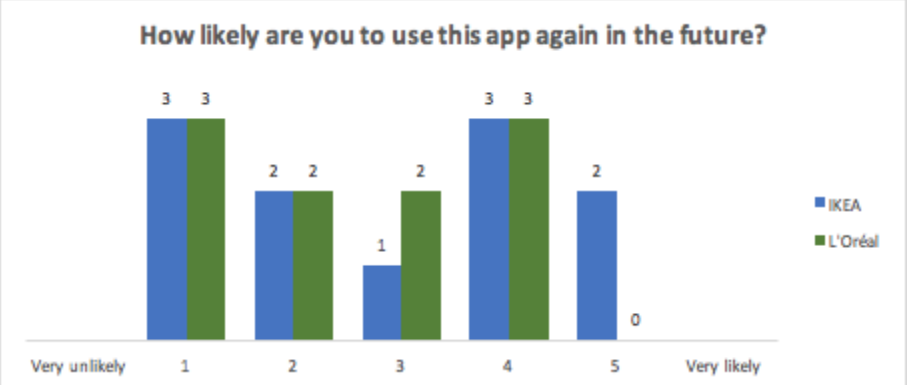
	• "I felt that I had the chance to see the product that I might want to buy and I could imagine that if I had imagined that if I would buy a specific piece of furniture like a chair or something then I would definitely see if that matches. If it isn't a match, then I could say 'Ok, I can take another chair that fits'. But I think it's pretty cool." (I7) • "I really liked, as I mentioned before, that you can take the product, choose which one you like and then if you did not like it you can take another product" (I7) • "This would be nice to have in the TV room" (I8) • "In terms of, if I found something I need … like if I wanted to be more interested in those furnitures … maybe … I actually see it as a better way, or more fun way to get to know more products." (I8) • "What I liked the most is .. you could actually do a visualization.. Of a product, which is kind of cool." (I8) • "So if I pick this can I buy it?", presses buy option (I9) • "Yeah. I think it would. … Especially because furniture is so .. ah, like tedious … the process of like purchasing furniture is so tedious … like the objects, you'd have to go to the … the way you do it in the us is that you either go to the showroom or you go to the website. And then on the website, you can't really see what it looks like. It can be deceiving. And the showroom, it's like very inconvenient… compared to the website. So I feel like AR furniture shopping is pretty cool actually." (I9) • "The app did give me information, but I just don't want to try out anything." (I11)
Unhelpful (7 participants)	• The app can improve your customer experience, your engagement, but I don't know if it would make me purchase more. (I1) • I will buy ikea products with or without the app (I2) • "It's a fun little gimmick" (I6) • "I guess it's nice. Sort of like picking the magazine up and doing like this [pretends to keep looking over top of a magazine that he moves up and down] … and then looking up and then down" (I6) • "Because you tend to overfocus on the thing, also because it jumps around a little bit. It doesn't stand still. You can't really place it and be like 'Stay there'. And then sort of watch the room." (I6) • "you could only have one furniture there. You couldn't re-furnish the entire room. That made it less useful than I would imagine it to be." (I6) • "I can't believe IKEA payed a lot of money to develop this, because I am not sure how many people will use it, but I'm not an Augmented Reality expert." (I6) • "It seems more like something I would at a dinner party be like "see what I made. Look at this. Now we can re-furnish the room" We'd have fun with it for five minutes. But it doesn't seem like something I would use when actually making a buying decision." (I6) • Only one product: "So you can't really use it as an app to redecorate stuff, you can only see how one product fits into it for example" (I7) • "Because there is some difference between when you dragged it around and the size when you scale it up and down. And that you can only have one product, so if you would like to see how they fit together it could be difficult .. to match" (I7) • "I can make it be as big as the whole room if I want to .. I can also make it tiny doll-size" Places product in the corner "which is maybe a bit troubling when I actually do a visualization of my house" (I8) • Tries to place it under TV - "that sort of looks like it is real" (I8) • "But I don't think it would be like a … I mean you only see… I mean it wouldn't be like that. When it comes to it. It's only like .. a projection. And .. the sizes … it is very hard to determine how big something actually is, because you can place it anywhere… like make small tables and chairs on the table here.. " (I8) • "Well, it's a nice app for seeing your furniture. But I wouldn't buy my stuff through this app. I want to see it in the store. " (I10) • ".. Yeah, maybe. I don't know [sounding unsure] … Because I am not sure if the imagination of a human is not enough. To like look at the catalog and think 'ah, it would look like this in my room'. So I don't know if that app is totally necessary there." (I11) • "you have to be able to put more than one object together, because right now I can only look at a desk, but maybe I want to buy a chair too. And then it gets really hard to compare two objects. But it's equally hard somewhere else…" (I11)

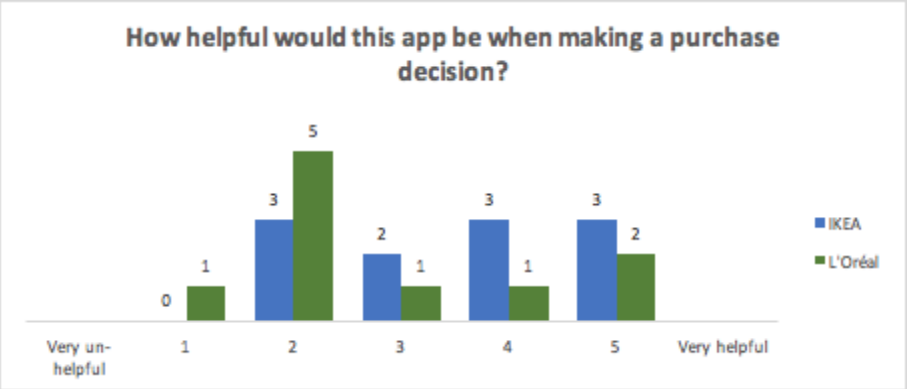
	• Before the app he was very likely to buy from IKEA, the app didn't change anything. (I11) • "The only information that I got is that my room is very small, but I could also get that information from looking at the catalog" (Interaction) (I11)

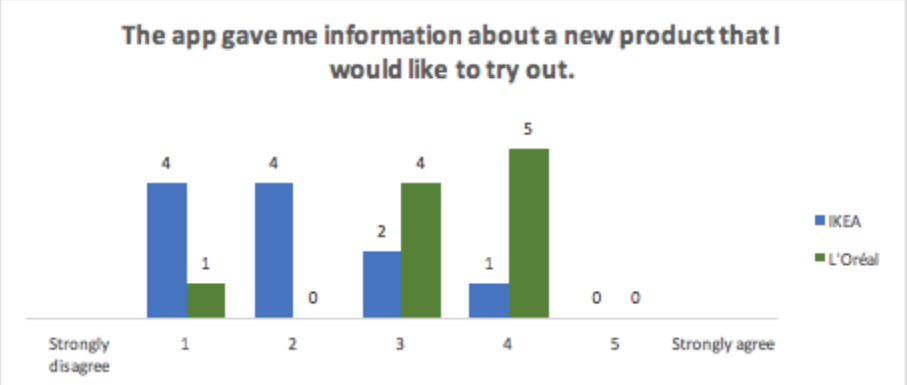
Appendix 5: Interview results

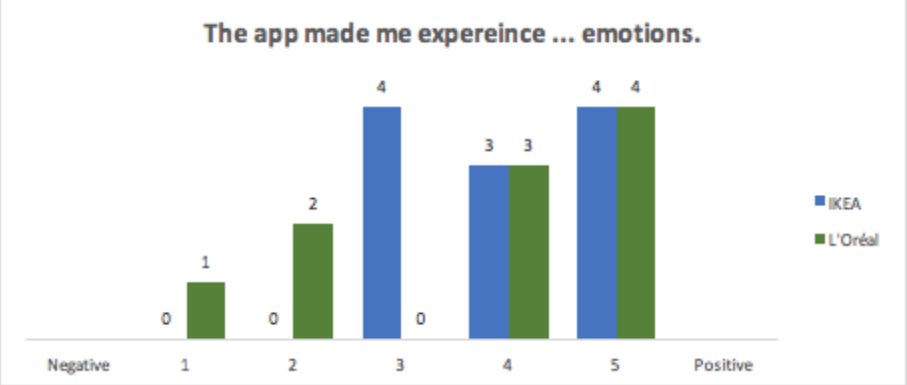
5.1. Overall experience

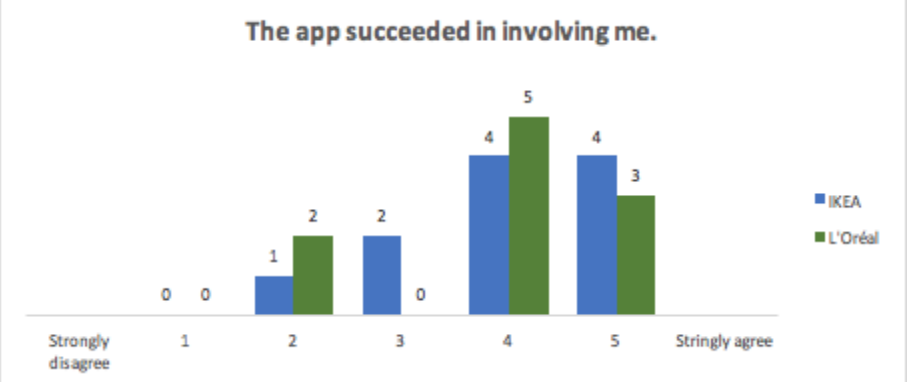


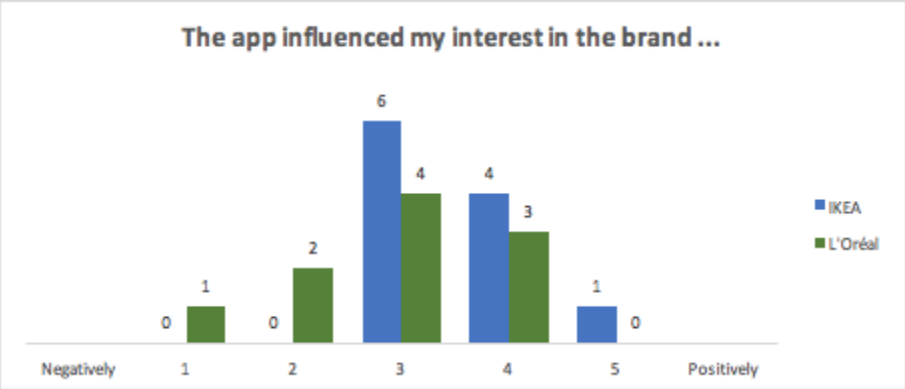



How helpful would this app be when making a purchase decision?
0
1
3
5
2
1
3
1
3
2
Very un-helpful
1
2
3
4
5
Very helpful
IKEA
L'Oréal

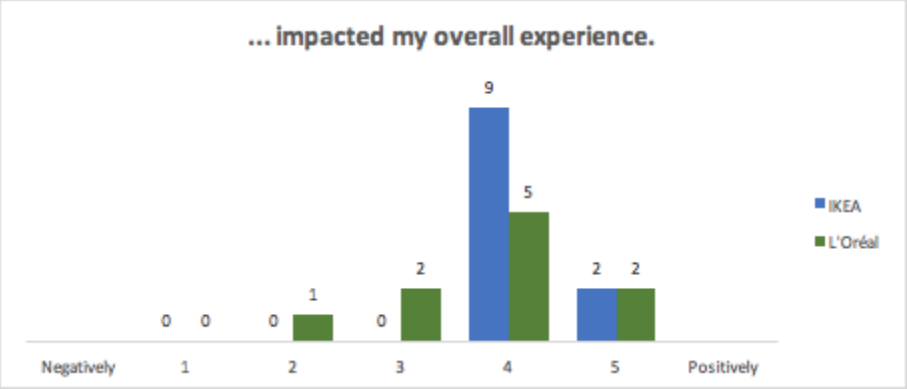

The app gave me information about a new product that I would like to try out.
4
1
4
0
2
4
1
5
0
0
Strongly disagree
1
2
3
4
5
Strongly agree
IKEA
L'Oréal

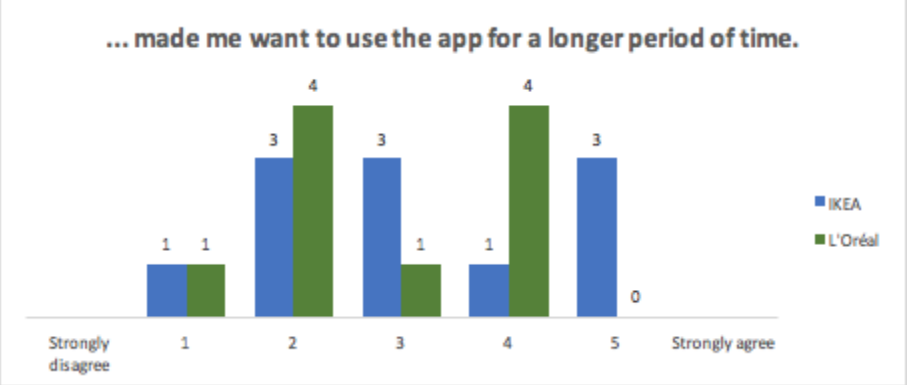

The app made me expereince ... emotions.
0
1
0
2
4
0
3
3
4
4
Negative
1
2
3
4
5
Positive
IKEA
L'Oréal

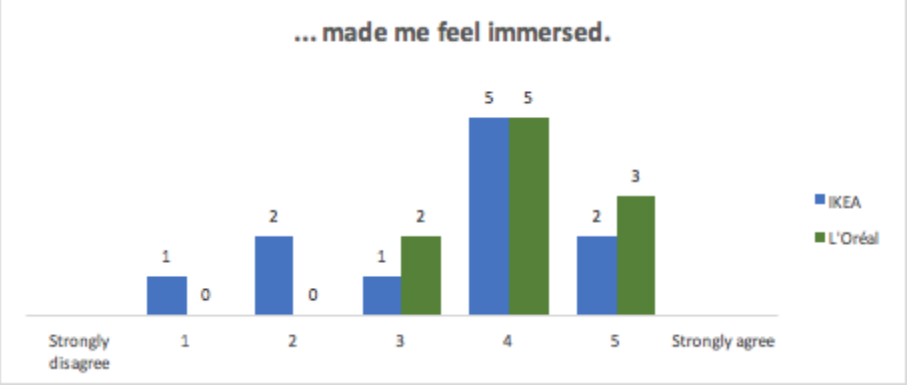

The app succeeded in involving me.
0
0
1
2
2
0
4
5
4
3
Strongly disagree
1
2
3
4
5
Stringly agree
IKEA
L'Oréal

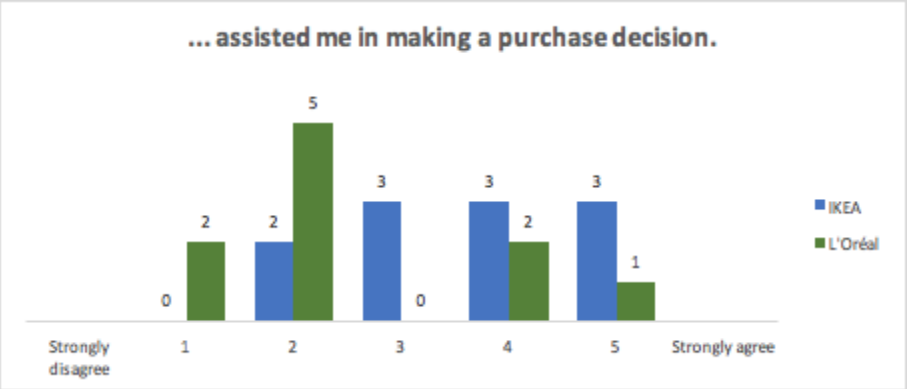

The app influenced my interest in the brand ...
6
4
4
3
2
1
0
0
1
0
IKEA
L'Oréal
Negatively
1
2
3
4
5
Positively

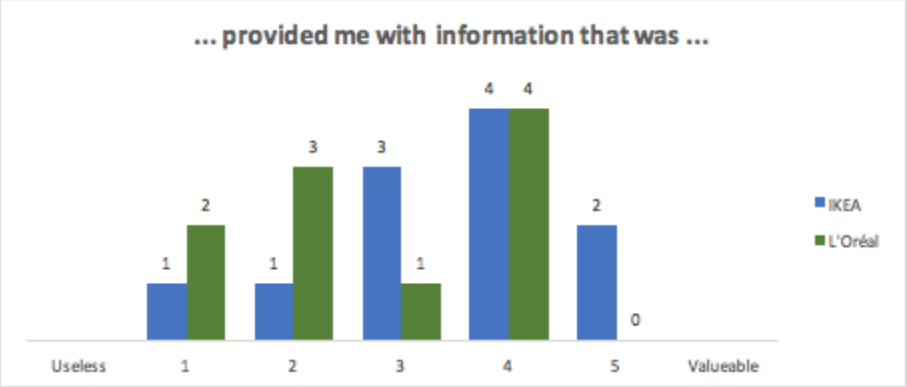
5.2. Augmentation

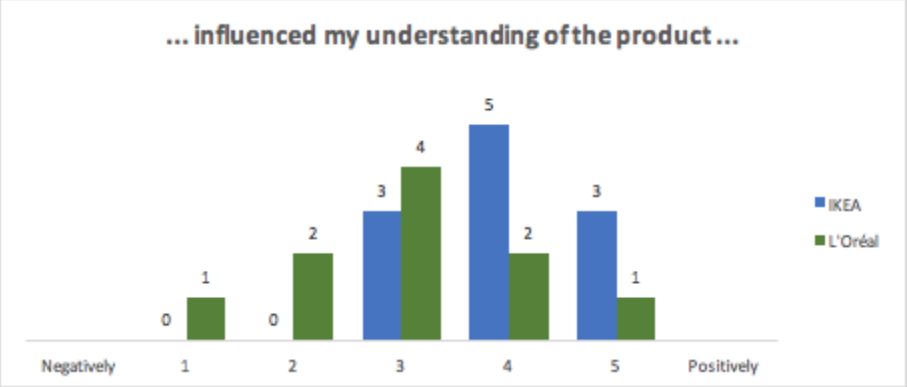


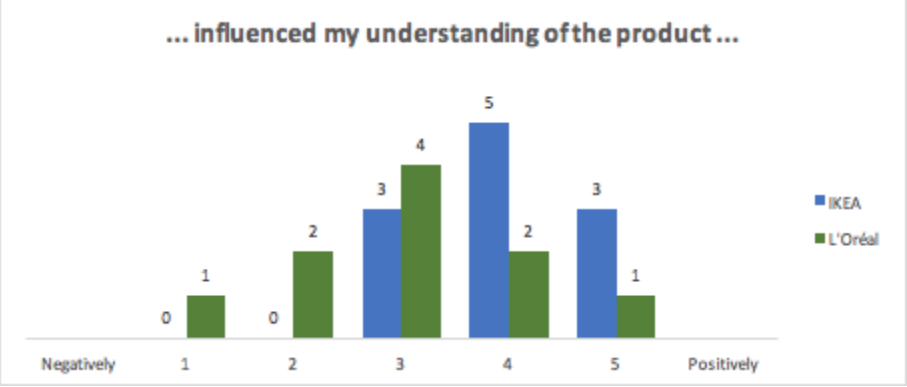


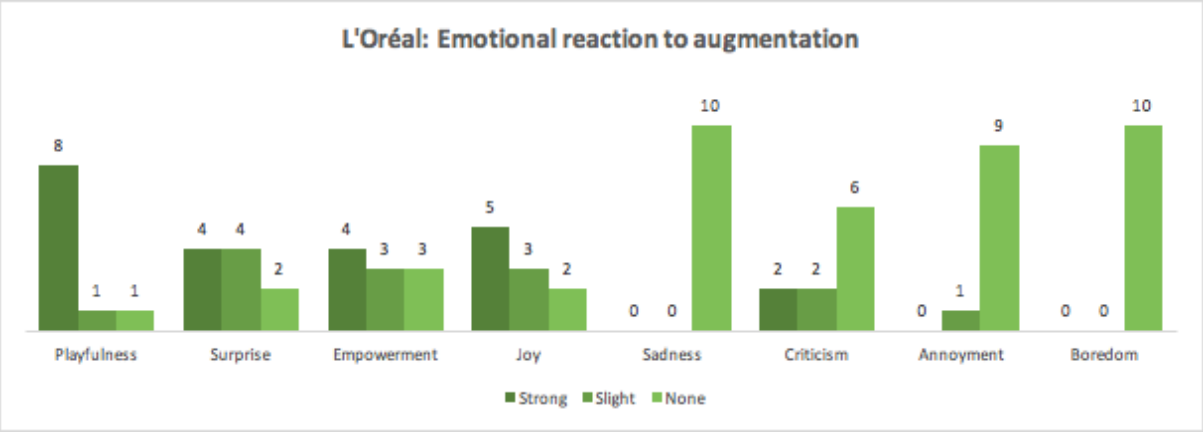


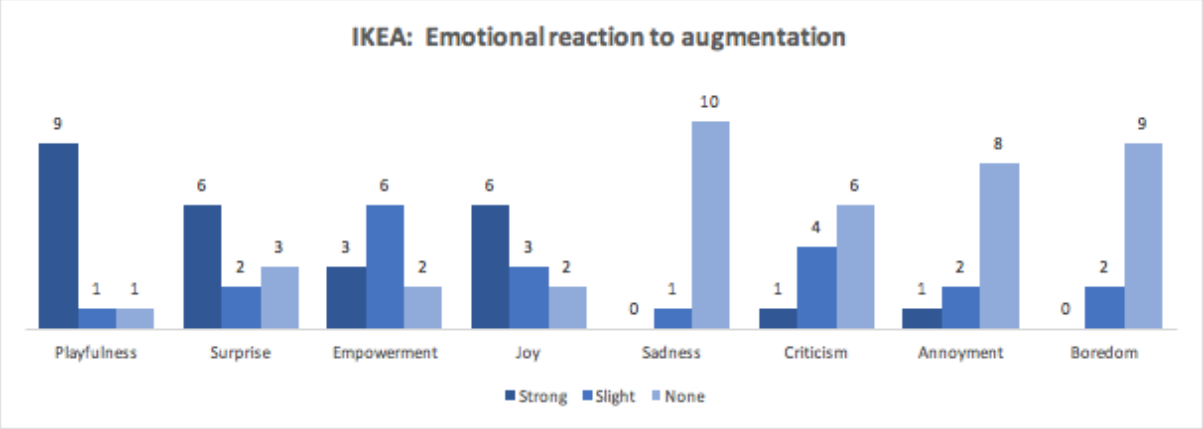

... assisted me in making a purchase decision.
0
2
2
5
3
0
3
2
3
1
IKEA
L'Oréal
Strongly disagree
1
2
3
4
5
Strongly agree


... provided me with information that was ...
1
2
1
3
3
1
4
4
2
0
IKEA
L'Oréal
Useless
1
2
3
4
5
Valueable

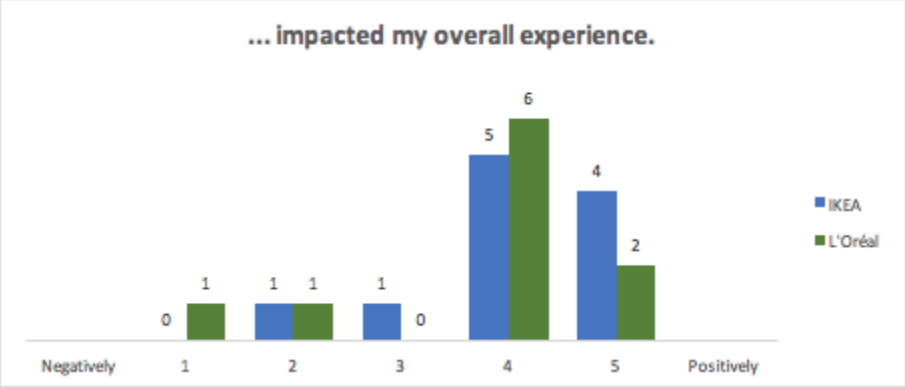

... influenced my understanding of the product ...
0
1
0
2
3
4
5
2
3
1
IKEA
L'Oréal
Negatively
1
2
3
4
5
Positively


... influenced my understanding of the product ...
0
1
0
2
3
4
5
2
3
1
IKEA
L'Oréal
Negatively
1
2
3
4
5
Positively

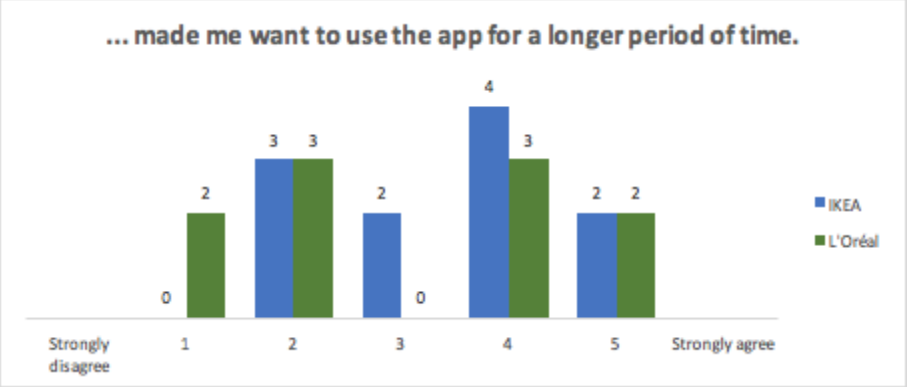


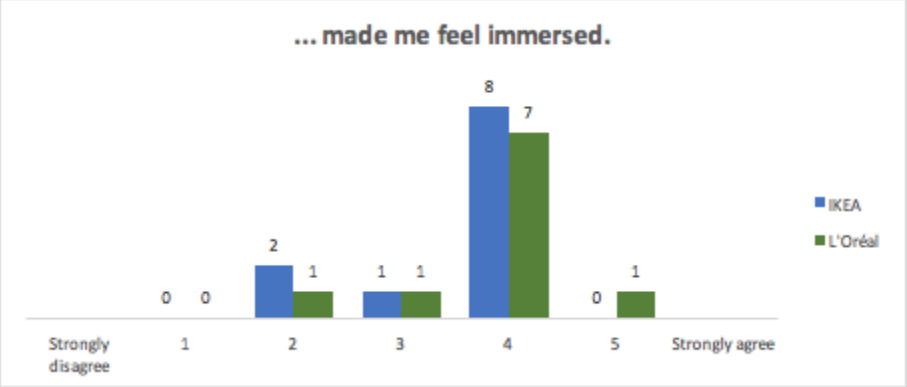


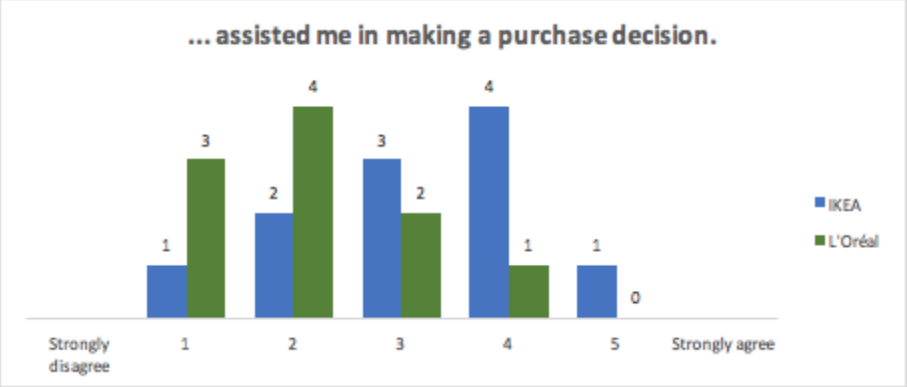
5.3. Interactivity

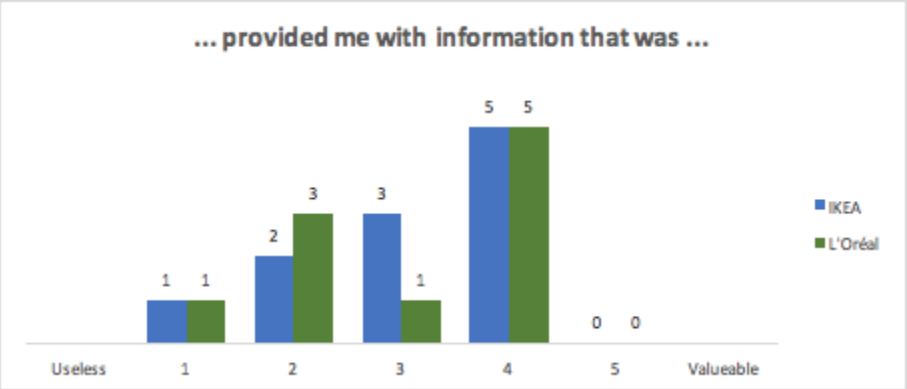


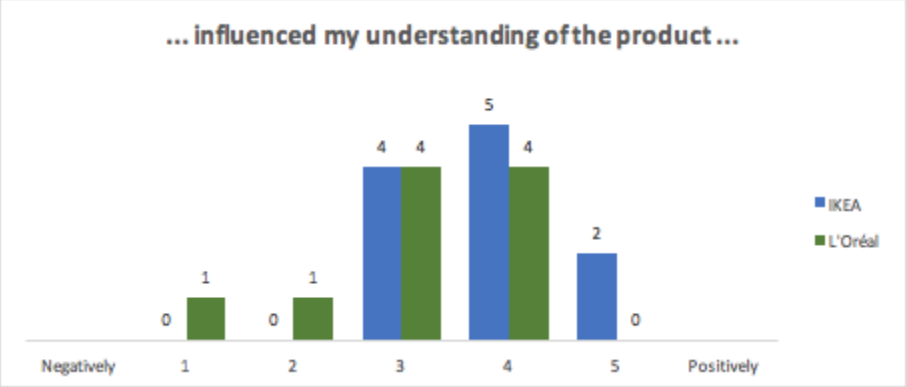

... made me want to try more products than I usually consider.
1 1
0 2
1 2
5 2
4 3
IKEA
L'Oréal
Strongly disagree
1
2
3
4
5
Strongly agree


... made me want to use the app for a longer period of time.
0 2
3 3
2 0
4 3
2 2
IKEA
L'Oréal
Strongly disagree
1
2
3
4
5
Strongly agree

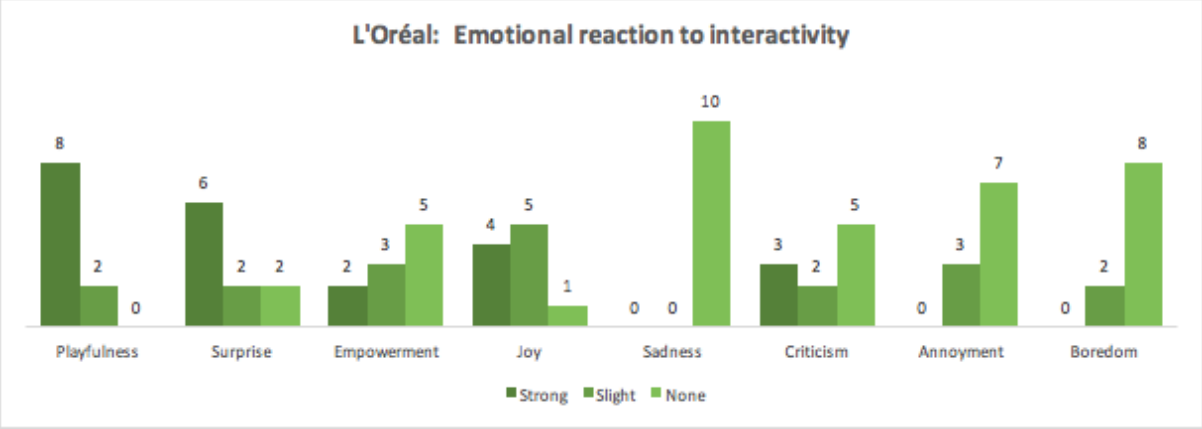

... made me feel immersed.
0 0
2 1
1 1
8 7
0 1
IKEA
L'Oréal
Strongly disagree
1
2
3
4
5
Strongly agree

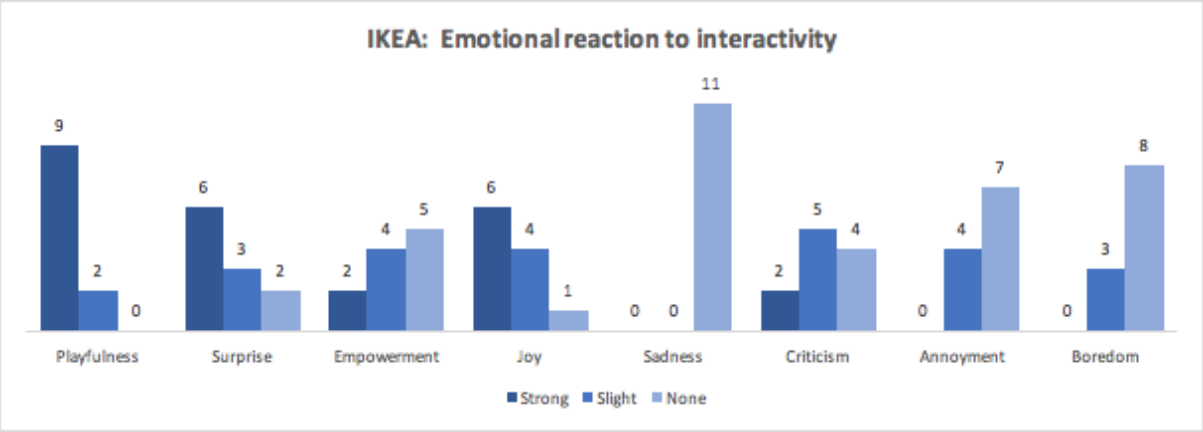

... assisted me in making a purchase decision.
1 3
2 4
3 2
4 1
1 0
IKEA
L'Oréal
Strongly disagree
1
2
3
4
5
Strongly agree


... provided me with information that was ...
IKEA
L'Oréal
Useless
Valueable
1 1
2 3
3 1
5 5
0 0
1
2
3
4
5

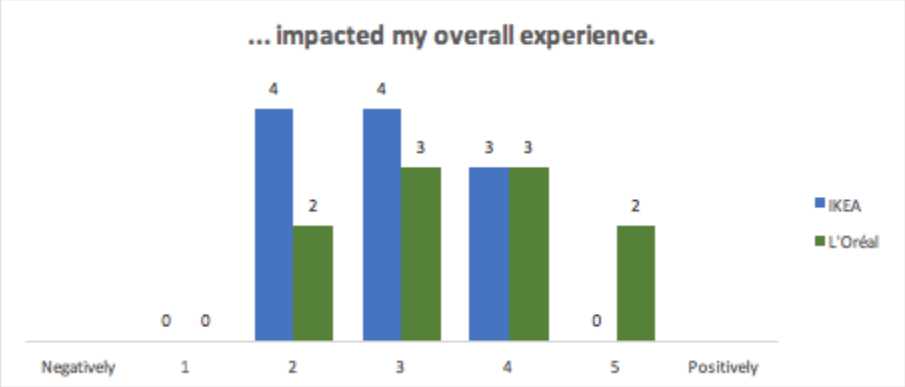

... influenced my understanding of the product ...
IKEA
L'Oréal
Negatively
Positively
0 1
0 1
4 4
5 4
2 0
1
2
3
4
5

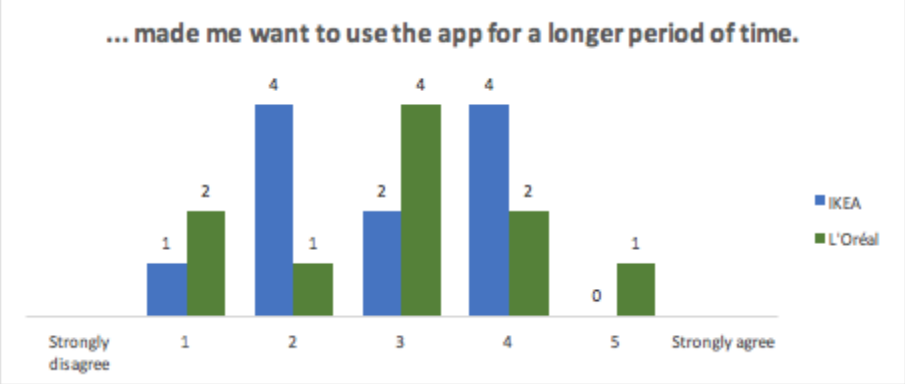

... influenced my intention to purchase an IKEA/ L'Oreal product the next time I need to buy furniture/ cosmetics.
IKEA
L'Oréal
Negatively
Positively
0 1
0 1
5 4
4 4
2 0
1
2
3
4
5

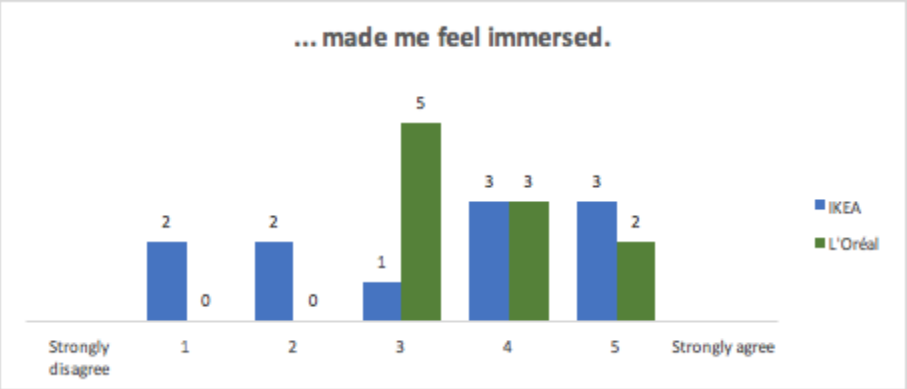

L'Oréal: Emotional reaction to interactivity
Playfulness
Surprise
Empowerment
Joy
Sadness
Criticism
Annoyment
Boredom
Strong
Slight
None
8 2 0
6 2 2
2 3 5
4 5 1
0 0 10
3 2 5
0 3 7
0 2 8

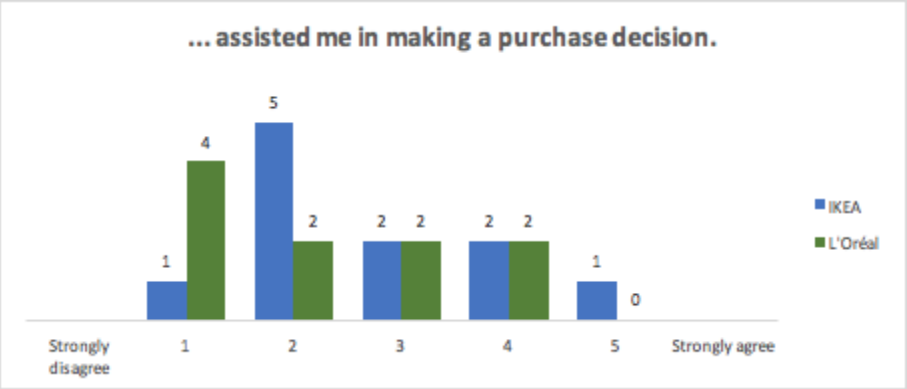


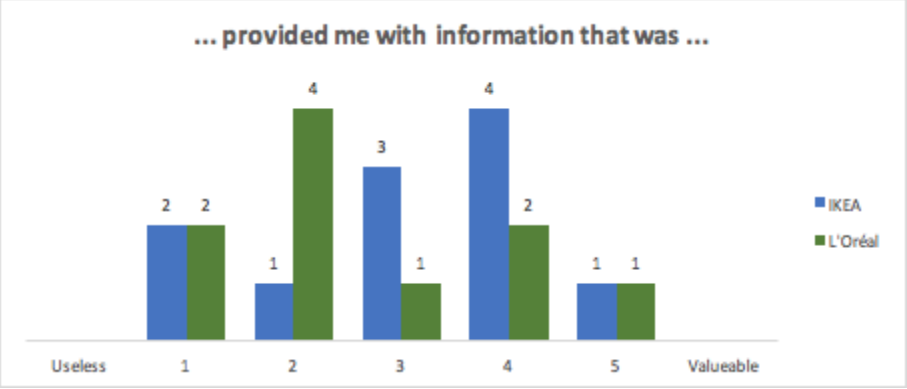
5.4. Registration

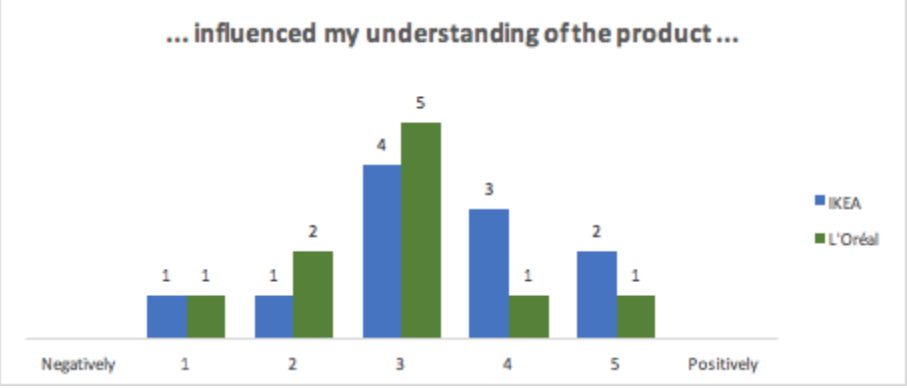


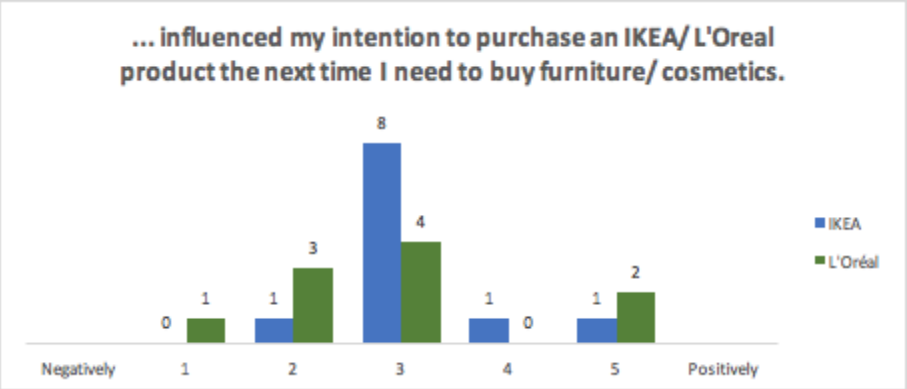


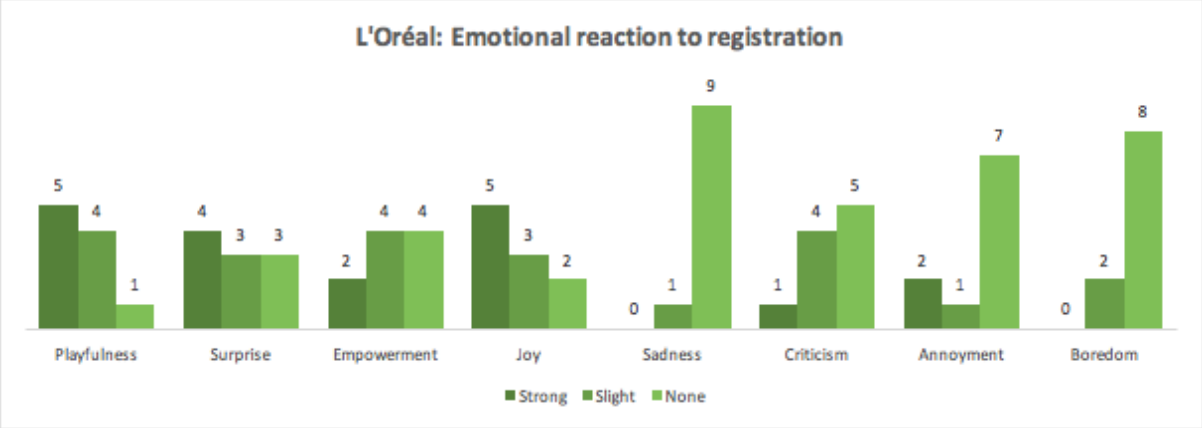

... made me feel immersed.
2
0
2
0
1
5
3
3
3
2
IKEA
L'Oréal
Strongly disagree
1
2
3
4
5
Strongly agree

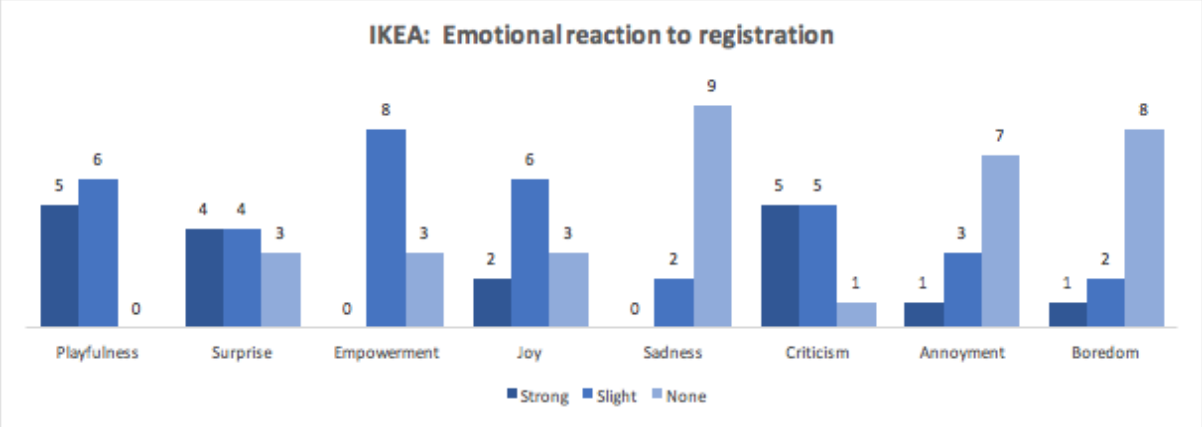

... assisted me in making a purchase decision.
1
4
5
2
2
2
2
2
1
0
IKEA
L'Oréal
Strongly disagree
1
2
3
4
5
Strongly agree


... provided me with information that was ...
2
2
1
4
3
1
4
2
1
1
IKEA
L'Oréal
Useless
1
2
3
4
5
Valueable

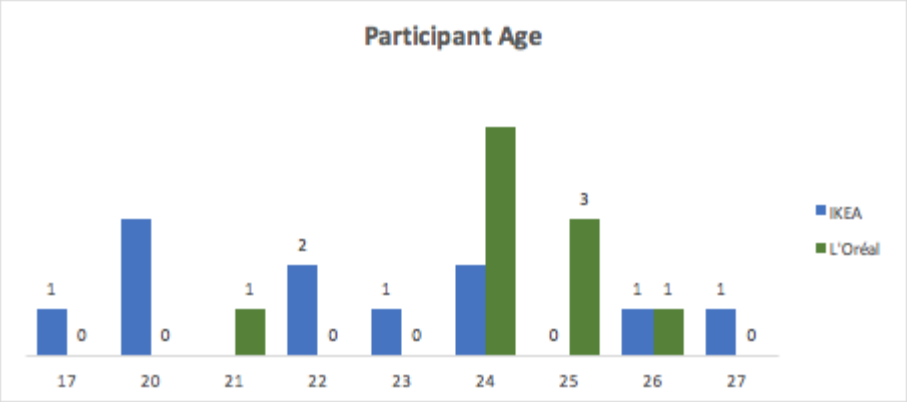

... influenced my understanding of the product ...
1
1
1
2
4
5
3
1
2
1
IKEA
L'Oréal
Negatively
1
2
3
4
5
Positively

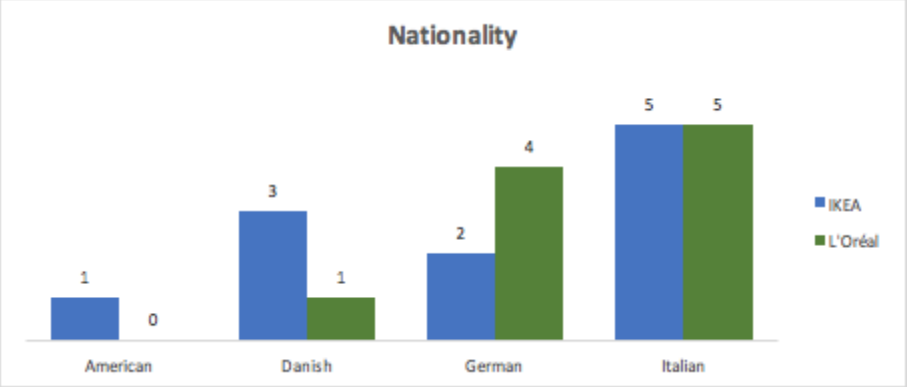

... influenced my intention to purchase an IKEA/ L'Oreal product the next time I need to buy furniture/ cosmetics.
IKEA
L'Oréal
Negatively
Positively
0
1
1
3
8
4
1
0
1
2


L'Oréal: Emotional reaction to registration
Playfulness
Surprise
Empowerment
Joy
Sadness
Criticism
Annoyment
Boredom
Strong
Slight
None
5 4 1
4 3 3
2 4 4
5 3 2
0 1 9
1 4 5
2 1 7
0 2 8

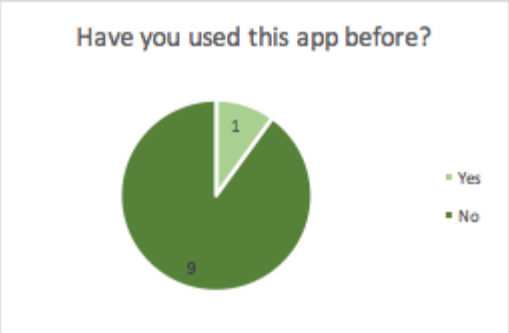

IKEA: Emotional reaction to registration
Playfulness
Surprise
Empowerment
Joy
Sadness
Criticism
Annoyment
Boredom
Strong
Slight
None
5 6 0
4 4 3
0 8 3
2 6 3
0 2 9
5 5 1
1 3 7
1 2 8

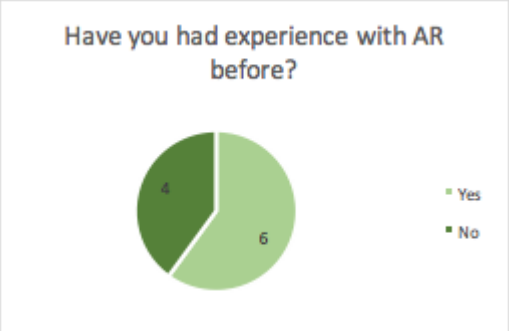
5.5. Participants

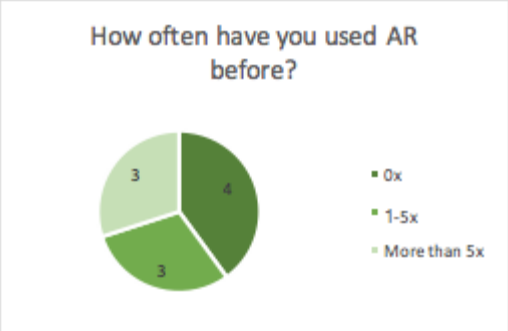




a) Sample L'Oréal

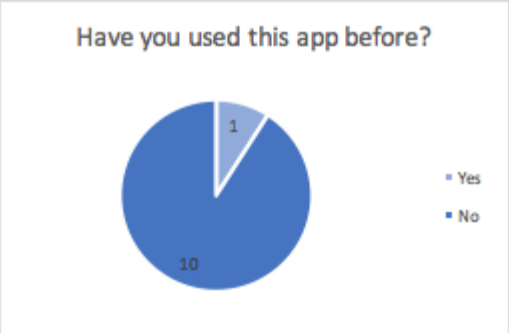




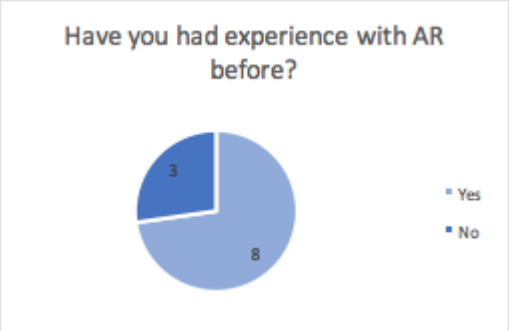


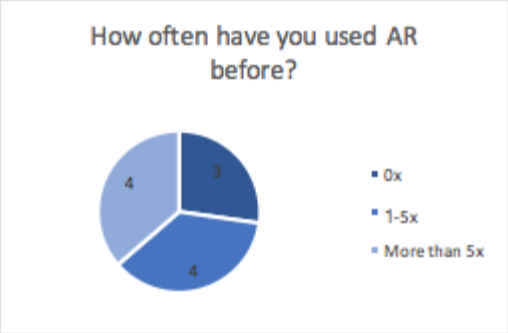
b) Sample IKEA


How often do you buy furniture?
1
1
9
At least once a month
At least once every three months
Once a year or less
Never


Have you used this app before?
1
10
Yes
No


Are you interested in apps in general?
1
10
Yes
No


Have you had experience with AR before?
3
8
Yes
No


How often have you used AR before?
3
4
4
0x
1-5x
More than 5x