THE HALO EFFECT OF SMARTPHONE BRANDS

Smartphone's brand equity influence on the user experience of third-party smartphone applications

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Abstract

Purpose User experience (UX) has become increasingly important in the smartphone ecosystem and there are smartphone companies that have a reputation for having excellent UX. Yet, it is unclear if this reputation extends to third-party applications. This study aims to investigate if smartphone brand equity extends to smartphone application's UX by determining the influence of a brand's usability equity and desirability on the expected and perceived UX of smartphone applications. **Method** Participants of an online experiment were exposed to an application which was running standalone or on one of three different smartphone brands. After the exposure, they were asked to judge the application's UX as well as assign blame for mistakes made in the observed interaction with the interface. **Results** Usability equity showed a substantial amount of significant correlations and linear regressions, brand desirability did not. Usability equity correlate with both perceived UX and mistake attribution but only mistake attribution shows significant linear regressions. When split by group only Samsung shows significant correlations and linear regressions. **Conclusion** These results suggest that smartphone brand equity marginally influences UX of third-party applications in certain cases. Brand equity mainly influences the attribution of mistakes and the extent to which smartphone brand equity influences the UX of third-party applications differs between brands.

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1 Introduction

Android applications have long been believed to be of lower quality than those of iOS. This is nicely illustrated by Dieter Bohn (2016) executive editor of the popular technology news website The Verge, who wrote the following for the review of Google's new Android phone: "In general, the persistent knock on Android is that its third-party apps are slightly worse than on iOS and that it can often feel slower or 'jankier'. I think that these arguments still have some merit, but not as much as the conventional wisdom would have you believe." It is interesting to note that he describes the applications as 'feeling' slower instead of actually being slower.

And he is not alone: If you read a comment section of a smartphone review or visit a forum about smartphones you will persistently find people arguing that applications on iPhones are better, more beautiful, and more polished. As mentioned above this is mostly due to "conventional wisdom" based on the fact that in the early days Apple's third-party applications were better than those of Android phones. This is partly the result of Apple's relentless focus on user experience (UX). Apple focuses on UX so much they do not shy away of sacrificing on usability in order to create a product that has a greater overall UX. The charging port on the bottom of the Magic Mouse is a good example of this. Apple does this despite the fact that usability is an important factor in UX (Agarwal & Meyer, 2009). This focus on UX led Apple to gain a reputation for having a great UX.

However, fans of other smartphone vendors will tell you their applications are better because they provide more options and functionality, which again, is a stereotype based on facts. But do these arguments still have merit? Or is it merely the stereotype attached to the smartphone brands of the device running these applications, that influences the way users experience them? It is not far-fetched to assume that the way people perceive smartphone brands influences their evaluation and experience of the actual product.

The notion that smartphone brand can influence people's perceptions is supported by meta-analysis. This analysis performed by Rao and Monroe (1989) on research that investigated the influence of product characteristics like price and brand name on the evaluation of product quality, showed that brand name influences perceived product quality. Grewal, Krishnan, Baker, and Borin (1998) found that perceived product quality in turn greatly influences the consideration to purchase a product. Furthermore, Chu, Choi, and Song (2014) found that the effect of brand name extends from the retailer to the products of other brands they sell, especially when the other brands are less known. It has to be noted that Grewal et al. (1998) found that not everybody is influenced equally: Their research shows informed consumers are more affected by brand name than uninformed consumers.

Even though there is a reasonable amount of research on the influence of brand equity on technology, there are gaps in the literature about smartphone brand equity's influence on smartphone applications. Research by Thorbjørnsen and Supphellen (2004) found that brand loyalty has a significant impact on the amount of website usage and concludes that it is of importance for brand equity. The influence of brand is also researched by Casalo, Flavián, and Guinalíu (2007), who found that perceived reputation influences consumer trust in a website.

Unfortunately, comparable studies for smartphone applications are missing. It is therefore not clear if smartphone brand equity influences other products in its ecosystem, like third-party applications. If so, it could be an important factor when developing products and services for smartphones and it could be a useful addition to UX models. For example: With the shift to digital headphones, a company that is developing these headphones might decide to release the version for a particular brand first to take advantage of that smartphone brand's brand equity. The goal of this research is to determine if the brand equity of the smartphone

manufacturer extends to the third-party applications running on its devices. This is done by investigating if brand equity (independent) is a determinant of user experience (dependent) and mistake attribution (dependent).

RQ: To what extent does smartphone brand equity influence the UX of third-party smartphone applications?

2 Theoretical Framework

The research question introduces three concepts that stand in need of theoretical analysis. First, the role of smartphone applications and the growing importance of UX is analyzed. Secondly, general brand equity will be discussed. The more specific variables, usability equity and brand desirability, will function as the independent variables since they are often either the main subject when discussing the quality of applications (usability) or are closely related to the halo effect (desirability). Subsequently, the concept of UX and the dependent variables expected UX and perceived UX will be explored. Measuring both expected and perceived UX can help to determine if brand equity influences the UX based on visuals alone, or if brand equity only exerts influence when people observed the operation and functioning of the interface. Lastly, the variable mistake attribution is explained. This variable is chosen because it can help explain how users experience a product.

2.1 Smartphones Applications

The way users experience products and services has become increasingly important, especially in industries with mature products and services which have been commoditized. An example of this is the smartphone industry: Where good smartphones used to be rare and expensive, you can now choose from dozens of brands and buy a high-end smartphone for under $400. Furthermore, smartphones used to be diversified in terms of functions, appearance (Vidas, Zhang, & Christin, 2011), and usability (Keijzers, Ouden, & Lu, 2008). However, nowadays they are nearly identical in this regard. And this is not only the case for the smartphones themselves, the same shift concurrently happened in the application ecosystems around these smartphones. The uniformity makes it hard for manufacturers and application developers to differentiate in terms of usability alone and therefore increases the importance of UX (Beauregard & Corriveau, 2007). This resulted in an increased competition for control of the UX (Rondeau, 2005).

The increase in quality and uniformity are mostly the result of phenomenal sales (5.5B since 2007 (Statista, 2016b). Competition led manufacturers to adopt very fast development cycles (Hartson & Pyla, 2012) which has led to plunging prices and matured products that are now owned by 2.1B people in the world (Statista, 2016a). For many of those people the smartphone is their first computing device, and for others they represent a major shift from time spent on their PC to time spent on their smartphone. This has caused a shift of attention from websites to mobile applications (Xu et al., 2011).

To capture the attention of customers, organizations have started to develop their own applications. Companies that offer applications can serve the customer a seamless experience as they switch between PCs and mobile devices during the day. Furthermore, it offers advantages for customers as applications can store and retrieve information quickly and allow the customer to continue their activity on all of their devices seamlessly. As such, applications are a good way of increasing the customer experience and as a result, they have increasingly become a core part of businesses worldwide. Furthermore, businesses that understood the importance of applications well, have been able to quickly capitalize on this. The app ecosystem has grown immensely (Xu et al., 2011), revenue is expected to grow from 51B in 2016 to 100B by 2020 (AppAnnie, 2016), and several multi-billion dollar businesses like Uber or Snapchat depend entirely on mobile applications.

Like mentioned before, this growth led to maturity in the application ecosystem and made UX more important (Hartson & Pyla, 2012). This, in turn, increases the need for research of smartphones' UX. Some researchers investigated usability and utilization of smartphones. For

example; Carter, Burley, Nykjaer, and Cade (2013) found that adherence to their weight loss app program was significantly higher for those who used a smartphone compared to a website. Keijzers et al. (2008) showed that usability differed significantly between smartphones of different brands for comparable functions and notably between two brands running the same operating system. Although it has to be noted that the differences in usability might have been a result of the differences in hardware running the operating system.

Overall, it is evident that applications are becoming more important as the shift from the computers and browsers to smartphone and applications continues. Therefore, it is important that research that focuses on mobile applications increases. It is not only important to look at simple metrics like efficiency and effectiveness, but also to consider the more complex constructs of UX. This is important from a consumer perspective in a matured market in which good usability alone is not good enough, and from a professional setting perspective, as an application that is very efficient but underused is in vain.

2.2 Brand Equity

It is long known that brand name influences people's perceptions: Researchers have been using blind product tasting tests for decades and consistently find that brand has a significant impact on the perceived quality of the product. Makens (1965), for instance, researched the phenomenon and found that a turkey receives higher ratings when people believe it to be of a popular brand compared to turkey believed to be of a less popular brand. More recent research by McClure et al. (2004) found the same effect with soda served in branded cups compared to unbranded cups. In addition to that, brand name and the perceived product quality linked to that name influences consumer's experience of products, product image and purchase intention (Grewal et al., 1998).

The brand name of a product changes people perception because they evoke a specific attitude which according to Ajzen and Fishbein (1980) is defined as "an index of the degree to which a person likes or dislikes an object" (p. 64) and is, therefore, a simpler version of reputation, which is rather complex. Attitudes can be influenced by stereotypes; Hassenzahl (2004) describes stereotype as "a consequence of an implicit personality theory" where individuals believe that a certain attribute has a relation to another, like beauty, and skill. Individuals apply these relations continuously and will approach others with an attitude based on these easily identifiable attributes and the non-accessible attributes they relate to the identifiable ones. Hassenzahl goes on to describe that he expects the same process being applied to products. He also warns of the consequences of this process: "On one hand, beliefs about covariation between attributes (e.g., if it looks clear, it will be easy to handle) allow for inferences beyond the merely perceived. On the other hand, those beliefs may also serve as a basis for inappropriate generalizations (i.e. stereotyping)" (p. 322).

These generalizations become part of a brand's image; Sheng and Teo (2012) state that "In line with the definition of brand equity for mobile services or mobile brand equity, brand image also depends on brand awareness, brand association, brand quality, and brand loyalty" (p. 141). These concepts which influence brand equity and brand image, are in turn influenced by many factors; from marketing to social circles. Spool (1996) poses that many of these factors are forms of indirect brand experience and notes that indirect experience needs multiple exposures to be effective and influence brand perception. These arguments are strengthened by research from Homer (2008). He wrote that (values associated with) beliefs are what make up the hedonic attitude towards the brand which can be influenced by direct or indirect contact with the brand. He also notes that brand associations are important for the attitude towards the brand and that exposure to negative information has a relatively strong impact on attitude

leading to a low-quality image. However, research by Jacoby, Olson, and Haddock (1971) shows that if a brand has a strong positive image, it increase the influences brand image has on product experience.

Supporting Homer's theory that negative information impacts brand attitude and brand image is research by Olson and Dover (1978) which shows that repeatedly informing consumers influences their experience (even if the information in question is false). This implies that if people constantly claim that applications running on a specific brand of phone are better, it influences other's experience of that brand. All the information people receive about a brand influences how they perceive the brand and ultimately leads to the brand getting a certain reputation. Rubin, Rubin, Graham, Perse, and Seibold (2010) (cited in Hardell-Illgen, 2015) describe brand reputation as the way the public perceives an organization. Coombs and Holladay (2011) define brand reputation as the "aggregate evaluation that stakeholders make about how well an organization is meeting stakeholder expectations based on past behaviours" (p. 35) This perception or evaluation distinguishes an organization from others (Hardell-Illgen, 2015).

All these combined feelings and thoughts people have regarding the brand is what some researcher call 'brand equity'. Sheng and Teo (2012) describe brand equity as including but not limited to, favourable impressions, attitudinal dispositions, and behavioural preferences. Konecnik and Gartner (2007) used the definition to measure brand image (Sheng & Teo, 2012), and Ambler, Keller, and Lemon (2002) call these feelings and thoughts "customer mind-set". Ambler et al.'s (2002) description states that all the thoughts in the minds of people including brand awareness, brand attitude, brand activity, and experience, make up the customer's mind-set. It becomes clear that researchers use different terms to describe brand equity or use similar definitions for narrower constructs. This might be the result of brand equity encompassing all these other concepts that describe people's views and feelings towards brands like brand reputation, brand image, and attitude towards the brand. In this research, the definition of customer mind-set from Ambler et al. (2002), which is line with Yoo and Donthu's (2001) description of brand equity, is used for brand equity.

2.2.1 Usability Equity

Usability has become an important factor in designing products over the last few decades. Umar and Ghazali (2014, p. 13) note that "As companies are seeing the benefits of designing and developing their products with user–oriented methods instead of technology oriented methods". Usability, as defined by ISO 9241-11 (ISO, 1998), is "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context.

Lee and Koubek (2010, p. 530) note that "What constitutes a good product or system has been traditionally explained by relating it to usability", but as usability has become a more understood concept for scholars and practitioners, it has increasingly become table stakes (Hartson & Pyla, 2012); it is a minimum requirement, a characteristic that is simply assumed to be there by its users. This is in line with the theory of experiential marketing (Schmitt, 1999). Hassenzahl (2003, p.31) poses that: "Experiential marketing stresses that a product should no longer be seen as simply delivering a bundle of functional features and benefits - it provides experiences. It assumes that customers take functional features, benefits, and product quality as a given". Even though usability has become a minimum requirement, it is still a factor that influences users' evaluation of product attributes, and it is therefore still an important predictor of user experience. According to (Maguire, 2013) usability has substantial influence on UX and can lead to increased brand position (Park, Feick, & Mothersbaugh, 1992).

It is not unlikely that a smartphone brand's usability equity (all the thoughts and feelings of a person regarding a brand's usability) influences a person's experience with smartphones of that brand. Lefkoff-Hagius and Mason (1993) researched the effect of brand on product preference and found that although products might be similar in characteristics, consumers might still have a preference for a specific brand based on its image. This increases the importance of brand in matured product categories where it is harder for companies to differentiate with product characteristics.

2.2.2 Brand Desirability

Jetter and Gerken (2007) note that it is not only the more concrete factors like usability that influences UX but also characteristics like coolness and sexiness: characteristics that are clearly depending on brand. These kind of brand characteristics are important because people want to be perceived in certain ways, and use objects to express themselves. For an object to be used as a form of expression it needs to reflect an image. As a result of the wish of consumers for objects to reflect an image, products are not only bought for their functions but also because of their symbolic benefits (Lefkoff-Hagius & Mason, 1993). These benefits might include satisfaction, or how it improves the owner's ability to be seen in a certain way (e.g. cool or associated with others). They describe products as having two benefits: utilitarian (its functions) and symbolic. Lefkoff-Hagius et al. wrote the following about symbolic attributes: "symbolic attributes of a product reveal how product use and/or ownership associates the consumer with a group, role, or self-image" (p. 101).

This association is partly caused by a 'halo effect': "Individuals in company of a beautiful friend are also perceived more favourably compared to being unaccompanied" (Hassenzahl, 2004, p. 341). It is possible that this so-called halo effect (Nisbett & Wilson, 1977) also applies to brand. The concept of separate attributes influencing each other is also researched by Tractinsky, Katz, and Ikar (2000). They found that the attributes of a device which are perceived first, (e.g. beauty or brand), may influence attributes which are perceived later, (e.g. UX). However, Hassenzahl (2004) notes that although users might attribute certain positive values to a device (e.g. usability) it does not necessarily mean that it will lead to overall positive evaluations of the device.

2.3 UX

According to Umar and Ghazali, (2014) UX "is considered to be one of the most important quality factors in the development of an interactive software application" (p. 13). After all, a system that does not properly achieve its user's goals is not useful. Users realize this and it, therefore, weighs heavily in their preferences (Sangwon Lee & Koubek, 2010). Usability has become a minimum requirement which is often largely fulfilled for many modern technological devices, this led people to look for hedonic fulfillment Conley (2011). This is similar to a pyramid of Maslow; after basic needs have been fulfilled, people start looking for hedonic fulfillment. And like in a pyramid of Maslow, there is a minimum level of usability (basic needs) that needs to be achieved because UX values like aesthetics cannot make up for a substantial lack of usability (Kuijk, Preijde, Toet, & Kanis, 2009).

Although most scholars take a more holistic approach to UX compared to usability (Allam, Razak, & Hussin, 2008), what actually constitutes UX is still a topic of debate (Hassenzahl & Tractinsky, 2006). Demir, Desmet, and Hekkert (2006) (cited in Desmet & Hekkert, 2007) approach UX entirely from the user's perspective and define it as "The entire set of affects that is elicited by the interaction between a user and a product" (p. 160). Nielsen and Norman (2013) on the other hand, explain UX in more functional terms which leans more towards customer experience, "All aspects of the end-user's interaction with the company, its

services, and its product" (para. 1). For this research the following definition of UX by Hassenzahl and Tractinsky (2006) is used because it equally focuses on the user, the system and the context: "A consequence of a user's internal state (predispositions, expectations, …), the characteristics of the designed system (e.g. complexity, …) and the context (or the environment) within which the interaction occurs" (p. 95).

The predispositions and expectations mentioned in Hassenzahl and Tractinsky's definition of UX are important because users might have preconceived beliefs (brand equity) based on product characteristics like brand or price. These beliefs which might influence their experience before they interact with it (expected UX) and after they interact with it (perceived UX). Research from Kuijk et al. (2009) shows that experienced usability can change substantially after use, particularly when the perceived usability is not good. It can be expected that this is also true for UX since usability influences UX (Roto, Law, Vermeeren, & Hoonhout, 2011).

2.3.1 Brand Influence on UX

The influence of brand on experience has been a topic of research for a long time; research from Wheatley and Chiu (1977) found that "An unknown or little-known brand name and low prices resulted in lower quality perceptions" (p. 72). Research by Dodds and Monroe (1985) confirms that higher prices have a positive influence on quality perception and note that this effect increased when brand information was given. Consumers might be affected by brand information that suggests high prices (i.e. premium brands) even though the product in question might be low priced.

However, from Väänänen-Vainio-Mattila et al.'s (2008) perspective, brand does not directly influence the UX, but is rather mediated by expectation. Väänänen-Vainio-Mattila et al. also state that perceived UX can simply be reduced to whether a user's expectations are met or not. This would mean that, no matter how disliked a brand is, it will have good UX if it meets expectations. Another concept that is largely based on people's expectations and predispositions is cognitive dissonance. This concept states that when people's beliefs do not match certain events or knowledge, they will try to reduce the incongruence between them or "forget or reduce the importance of those cognitions that are in a dissonant relationship" (Festinger, 1957).

Beside theory on which factors influence user experience, there is also research available as to when these factors can influence user experience. Lee, Frederick, and Ariely (2006) argue that it is not simply the information that affects the experience but that the moment of disclosure of information related to the product, like brand, is important for the experience itself as well. Their experiment showed that disclosure retrospectively only influenced the experience marginally whereas disclosure beforehand significantly influenced the experience.

Overall it is clear that smartphone preference is greatly determined by brand name and close social circles (Mohd Suki, 2013). Brand influences UX, either through brand image, which can help reflect identity and give people the feeling of "being self-actualized just by coming into contact with the company" (Conley, 2011, para. 5) reputation, or by usability & desirability (González-zúñiga, Acuña-silvera, Martí-Godia, & Carrabina-Bordoll, 2016; Guo, 2012; Law, Roto, Vermeeren, Kort, & Hassenzahl, 2008; Rubinoff, 2004). Therefore, it is to be expected that some of the factors that determine UX (e.g. emotional state, expectations, self-confidence) are influenced by brand equity. Moreover, brand equity might have different influence on expectations and how the interface is perceived. Measuring UX by dividing it into expected UX and perceived UX can give more insight into the underlying mechanism of brand influence.

2.3.2 Expected UX

The concept of expected UX is supported by Allam et al. (2008). In trying to sketch a holistic overview of UX they assert that the experience of a product initiates ahead of the product being observed or the use of the product. Roto et al. (2011) note that: "People can have indirect experience before their first encounter through expectations formed from existing experience of related technologies, brand advertisements, presentations, demonstrations, or others' opinions" (p. 8).

This phase before use is also known as 'anticipated UX' (Allam et al., 2008). It is easy to imagine an example of anticipated UX; imagine a kid that is eagerly waiting for its new game console: This period before the interaction with the device influences the experience when it is actually used. This influence can both be positive (i.e. when it is even better than expected) or negative (i.e. when the expectations are not met).

Another example is that when people are longing for a specific experience, the experience in question is more likely to be pleasing. For example: When someone is craving for a pizza he/she will enjoy the pizza more than someone who is not craving for it. Klaaren, Hodges, and Wilson (1994) found that this phenomenon also applies when people believe a product will be of good quality. Their research shows that the joy perceived by watching is movie is not solely determined by the quality of the movie but also by the viewer's expectation of the quality. The pitfall arises when expectations are too high and cannot be met as this might result in disappointment, which in turn might lead to dissatisfaction (Oliver, 1980).

Expectations are also important in the context of applications. For example, because a user will see the interface before he/she starts interacting with it, it will have already observed the graphic design of the interface. Hassenzahl (2003) notes that: "The whole process of perceiving and constructing the character and experiencing consequences will always take place, no matter how insufficient the available information about the product seems to be" (p. 34). This assessment (judgment about design, functions, etc.) will immediately be evaluated in light of the current use case and context (e.g. This looks beautiful, but can I read this low contrast text in the sun right now?). All of these thoughts and evaluations, create and influence the user's emotional state and attitude towards the product (Hassenzahl, 2003).

Based on this theory of expected UX and the conclusion that brand equity influences UX, the following is hypothesized:

H1a: Higher usability equity of smartphone brands leads to higher UX expectations of third-party applications.
H1b: Higher brand desirability of smartphones leads to higher UX expectations of third-party applications.

2.3.3 Perceived UX

Whereas expected UX mostly focuses on the expectation derived from the visual, non-interactive representation of the interface, perceived UX focuses on the experience after usage of the system has been observed. According to Thüring and Mahlke (2007) perceived UX consists of three components: the "perception of instrumental qualities" (e.g. efficiency) "and non-instrumental qualities" (beauty) and "the user's emotional responses to system". Väänänen-Vainio-Mattila, Roto, and Hassenzahl (2008) note that from a consumer research point of view it can simply be reduced to whether the user's expectations are met or not. This is line with findings by Kuijk et al. (2009), who note that if the expected ease of use is underestimated, a surprisingly good ease of use can alleviate the pessimistic estimation of a product's characters anticipated experience.

As the product is being used more and more, the experience and information about the system are being expanded which might lead to an adjustment of the user's judgment regarding experience (Hassenzahl, 2003). As a result, there can be a discrepancy between the expected and perceived UX. Moreover, UX is highly dependent on the context. For example; an UX might be expected to be great because the expectation is formed out of an evaluation of the UX of an interface from a promotional video, but it might turn out that in the context of the user this interface is unusable (e.g. touch screens in places where people have to wear gloves). Kuijk et al. (2009) also argue that no amount of beauty, (which influences expected UX), can make up for a severe lack of usability (which influences perceived UX).

Based on this theory of Perceived UX and the conclusion that brand equity influences UX, the following is hypothesized:

H2a: Higher usability equity of smartphone brands leads to higher perceived UX of third-party applications.
H2b: Higher brand desirability of smartphones leads to higher perceived UX of third-party applications.

2.3.4 Mistake Attribution

The way consumers experience products has become an increasingly important concept in the human-computer interaction research (Hassenzahl, 2003). As usability became well understood, UX has become a field of interest for scholars. Another variable that is less studied in the setting of smartphone applications, however, is mistake attribution. Although mistake attribution is not a direct indicator of UX, it can help explain how users experience a product. For example; it can indicate a user's confidence or say something about how the user perceives an interface. After all, when problems arise it is likely that a user will attribute blame to the device if the user already believed the device was unstable. Arceneaux (2003) notes that mistake, or blame, attribution consist of two closely related judgments: 'causal responsibility' and 'treatment responsibility'. Causal responsibility focuses on what or who is the cause of the problem, whereas treatment responsibility refers to whom individuals assign responsibility to fix the problem (Iyengar, 1994).

The process of assigning causal responsibility is important as the problem can origin from multiple sources. Luyk (2008) distinguishes between multiple possible forms of problems with products: user mistakes, product fault, errors and product failure. Luyk (2008) speaks of a product fault when the there is a defect in the product. This product flaw may result in an error, at which moment it becomes visible for the user (Deckers, Janson, Ogg, & van de Laar, 2006). This product error plays a role in relation to UX. As discussed earlier, the overall UX is dependent of expected and perceived UX. Errors are often unexpected and lower the perceived experience. A single error can even have bigger impact, since the error, or the chain of errors while a single error often sets in motion, could result in product failure (Deckers et al., 2006). At this point, product fault has a high impact on UX, since the product does not live up to the requirements and expectations of the customer and will lead to customer complaints or returns (Petkova, 2003).

Besides product errors or failures that result from product flaws, it is also possible that incorrect handling by the user leads to errors or failures. The user might not know how to use the device or simply make a mistake as a result of the lack of attention. After the errors show, and the product possibly fails, the user might attribute the failure to a specific cause. Desmet and Hekkert (2007) argue for the use of the word 'attribute' since the user might not be able to locate the cause of failure and might attribute it to something else, possibly totally unrelated.

Another factor that plays a role in mistake attribution is a person's technical knowledge. In an experiment with voice-activated assistants, Sellen and Luger (2016) found that people with higher technical knowledge had more realistic expectations. As a result, they were less likely to make requests which are outside of the assistant's capabilities and more lenient when the device's response was poor. A factor that also plays a role in the attribution of mistakes is the ability to locate the task failure. Sellen and Luger (2016) observed that "those with a reportedly higher level of technical knowledge were more likely to locate task failure with the technology, whereas those who identified as non-technical were more likely to see the failure as their own" (p. 5292) and that people who blamed themselves also felt more negatively.

The importance of mistake attribution really shows in the consequence of the (wrong) attribution of mistakes. Sellen and Luger (2016) found that repeated attribution of mistake to a digital assistant led to decreased use of its more complicated and powerful capabilities. They also found that early failures affected the amount and type of future use. Oliver (2014) describes possible outcomes of the attribution of mistake like: "anger directed at the manufacturer for producing a defective product; guilt, a feeling of self-blame for making a wrong decision; or delight over the choice of an exceptionally good product" (p. 14).

The attribution of mistake plays a bigger role in UX than in usability. Usability is more focused on objective, utilitarian, measures, in which it is more relevant where the error occurred so it can be fixed. UX, on the other hand, is more focused on how the user experiences the product, making it less relevant how or where the error occurred and more important how the user experiences this error. Luyk (2008) reasons that blame might influence UX. For example: if a user encounters an error, it might blame the device for it, even though they might be responsible themselves. This blame might lead to a UX that disappoints because the experience does not live up to their expectations. Luyk (2008) calls this "underfulfillment" and argues that this might be influenced by emotions. She notes that Oliver (2014) asserts that emotions, which influence experience, are a result of judgments like blame.

Important to note is that the attribution process is not objective, and highly dependent on the user, this might lead to the attribution of errors to the wrong cause (Luyk, 2008). For example, research by Newell, Carmichael, Morgan, and Dickinson (2006) shows that age plays a role in UX, as seniors are more likely to blame themselves, as opposed to the device they are working with, when they are not able to operate a device. This is likely the result of a lack of confidence. Confidence in using the system or self-efficacy is defined by (Casalo, Flavián, Guinalíu, & Gurrea, 2006) as "a consumer feeling of security and ability about his or her decisions and behaviours" (p. 3) If a user believes that a certain brand consistently creates easy to use interfaces, it will have much more confidence interacting with it, possibly leading to fewer mistakes.

Brand can also influence self-efficacy through earlier experiences: Sellen and Luger (2016) found that early positive experiences resulted in positive expectations. However, this led to people doubting their own performance when their expectations were not met. Kuijk et al. (2009) mention that the first few negative usability experiences are possibly not attributed to the brand or at least do not result in damage to the brand image. Kuijk et al. note that "Possibly it takes several negative experiences before a brand image changes, depending on how 'solid' the customer's beliefs are." (para.2).

In conclusion: problems might arise from different causes and people are not always capable of locating the cause. Wrong attribution has consequences for UX, future usage intensity and possibly brand reputation. This is important because attribution is not objective and can lead to either the product being blamed or self-blaming. The attribution of mistakes is influenced by earlier experience, brand image, and self-efficacy (Karsh & Scanlon, 2007). Brand (usability) equity influences self-efficacy and the desirability of a brand might lead to cognitive dissonance.

This conclusion led to the following hypothesis:

H3a: Increase in usability equity of smartphone brands leads to increased attribution of mistake towards the user.
H3b: Increase in desirability of smartphone brands leads to increased attribution of mistake towards the user.

3 Method

3.1 Design

An experiment with three manipulations and one control group was designed to test the research questions. Brand usability equity and brand desirability are the independent variables and expected UX, perceived UX and mistake attribution are the dependent variables. See figure 1 for the research design.

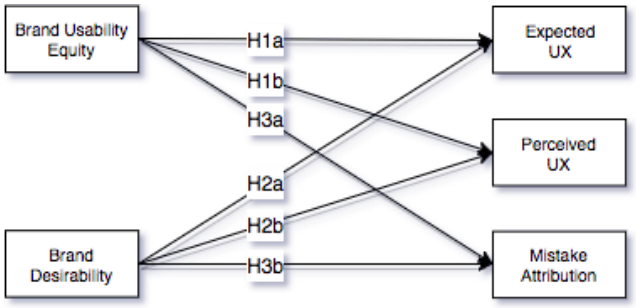

***Figure** 1 Research Design*

The design allows for exploration of the variables and the relation between the variables by means of ANOVAs, correlation analysis, and linear regressions. ANOVA's for the independent variables are able to reveal possible statistical significant differences of variance between groups. The outcome of the test can be useful to further explore the differences between brands. Incorporation of different brands not only allows for exploring possible variances between brands for the variables but can also give insight into possible differences in the underlying mechanisms of the model. Correlation analysis between the variables can test the statistical relation after which linear regressions can give insight into the underlying mechanisms of the relationships.

Measurement of the variables was performed by means of a questionnaire included in the online experiment. The questionnaire was designed in Dutch as this is the dominant language at the university and in the Netherlands. The goal was to collect 160 valid questionnaires to ensure that >30 participants per condition were available for data analysis. The participants were automatically, randomly and equally assigned to the four different manipulations. After removing the participants that did not meet the criteria the group sizes remained relatively equal (N=35-40). A comprehensive overview of the participants can be found in table 2.

To test the influence of brand, three smartphones from three distinctly different brands were chosen with varying degree of brand recognition. The brands used in this research are Apple, Samsung, and Huawei. For all of these brands, comparable phone models (i.e. screen size, introduction year, market segment) were chosen.

Qualtrics was used to administer the questionnaire because of its advanced functions and cross compatibility across devices. This was important as smartphones increasingly become a primary computing device and where used to fill in the questionnaire by approximately half of the participants (56% desktop - 44% mobile). The questionnaire was designed with a mobile-first approach which meant that compromises were needed. Since the experience between mobile devices can differ significantly the selection of tools that could be used was limited. Soundcloud was used for audio because of its HTML5 player which is cross-compatible across the most popular devices. For video's YouTube was deployed because it also is cross compatible. Changes in the HTML were made to allow for (Auto) full-screen playback across devices. A medium resolution video was used to ensure cross compatibility. Photos were served from Qualtrics with a 260x500 resolution. This guaranteed proper visibility on PCs without being too big to be properly viewed on mobile devices. Navigation buttons were disabled for 10 seconds to prevent participants from immediately clicking through to the next page.

3.2 Stimulus materials

In order to measure the influence of smartphone brand equity on third-party applications, four conditions were set-up. In three of the four conditions a smartphone application was showed on a smartphone, in the fourth condition the application was showed without any smartphone. Each of these brands was chosen for its specific position in the smartphone market.

First, Apple was chosen because of its terrific brand recognition to the point where the name became a synonym for the product type (iPhone). Moreover, the brand is known for its good usability and UX and like noted before its applications are widely considered to be the best of any smartphone. Apple has a 28% market share in The Netherlands (Smeets, 2016). For Apple, the iPhone 6S (plus), with a 4.7-inch (5.2-inch) screen, was chosen as this is Apple's newest and most high-end phone.

Secondly, Samsung was chosen as it has the biggest market share in the Netherlands (42%) (Smeets, 2016). Its brand is also widely known and its high-end models consistently score high in satisfaction reports from consumer advocacy groups. However, its usability is regarded inferior compared to that of an iPhone and is often described as complicated and bloated. Samsung's Galaxy S7, with a 5.1-inch screen, was chosen as this is Samsung's high-end phone and Apple's iPhone 6S main competitor.

The third brand used in this research is Huawei, it is the third biggest smartphone vendor in the Netherlands (Smeets, 2016). It has been available on the Dutch market for a relatively short time and it does not share the same brand recognition as Samsung and Apple do. Moreover, its first smartphones with which it entered the Dutch market were often low end and of subpar quality. Huawei released its P9 as the high-end model (5.2-inch screen) to compete with the Samsung Galaxy S7 and Apple' iPhone 6S so this phone was used in this research.

Besides the different conditions for smartphone brand, separate materials were also created to allow for measurements of both expected and perceived UX. In order to measure expected UX, the participants are shown a total of four stills of a recorded application and a video of the recording afterward in order to measure perceived UX.

The application used in this research is 'Tvshow time'. It is an application that allows users to follow their favourite TV shows. It keeps track of episodes already watched and when the next episode will be aired on television. Besides tracking, it allows users to find information about episodes, rate them, and make use of its social functions to interact with other fans of TV shows. The application was chosen because of its good ratings and number of installations. The application only has a few million installs (as of 2 October 2016) making the chance participants used it before very small. Moreover, the Android application has an average rating of 4.67 indicating that users like the application and find it useful.

The app has a design language which was consistent across mobile operating systems. Most applications adapt their design to the platform or borrow certain elements from other design languages (e.g. animations, symbols, interaction design). This app contained little to no operating system specific design languages and therefore did not carry any of the possible brand influence in the interface itself. The general design of the application is good but not necessarily innovative or very beautiful and the functions are useful but not necessarily innovative. This is important as it might have skewed the results excessively.

The application was recorded using a screen recorder on a Motorola Moto X 2014 as it has a high screen resolution and runs stock Android (original version as developed by Google) which allows applications to record the screen. The final video is made up of several screen recordings and was composed with Adobe Premiere pro. A voice over was recorded at the time of the screen recording and a final voice over resembling the original ones was later made and

mixed into the videos to make sure it was in sync and sounded natural. The screenshots were all made from the source material of the video which ensured that the participants were evaluating the same functions and visuals. The four screenshots from the video all show distinctly different parts of the interface and the task (adding a new show you want to follow).

In the video, a user is using the app to reach a particular goal (add a TV series to follow). The user gives comments on the process similar to a 'think aloud' user test; it states what its goal is, why it performs certain actions, considerations it is making, and responses to unexpected events. All the touch interactions with the interface are visible through a white dot that represents the location of the user's finger on the user interface. The user makes certain mistakes on purpose (i.e. wrong clicks) but successfully completes the goal.

The minimize interference of the measures by differences in UI the onscreen navigation buttons and status bar were removed from the visuals and the video and screenshots were placed in the different phone model renderings. The phone models were adjusted very slightly to ensure a perfect fit of the visuals in the phone rendering. All visuals had the same aspect ratio and resolution to make sure that this did not influence the measurements. The phone renderings were not further adjusted and brand markings were left on the phone to ensure maximum exposure of the brand to the participant.

The end result consisted of four different manipulations all with identical application visuals from the same source material and therefore excluding possible factors like screen size, response time, touch delay etc.

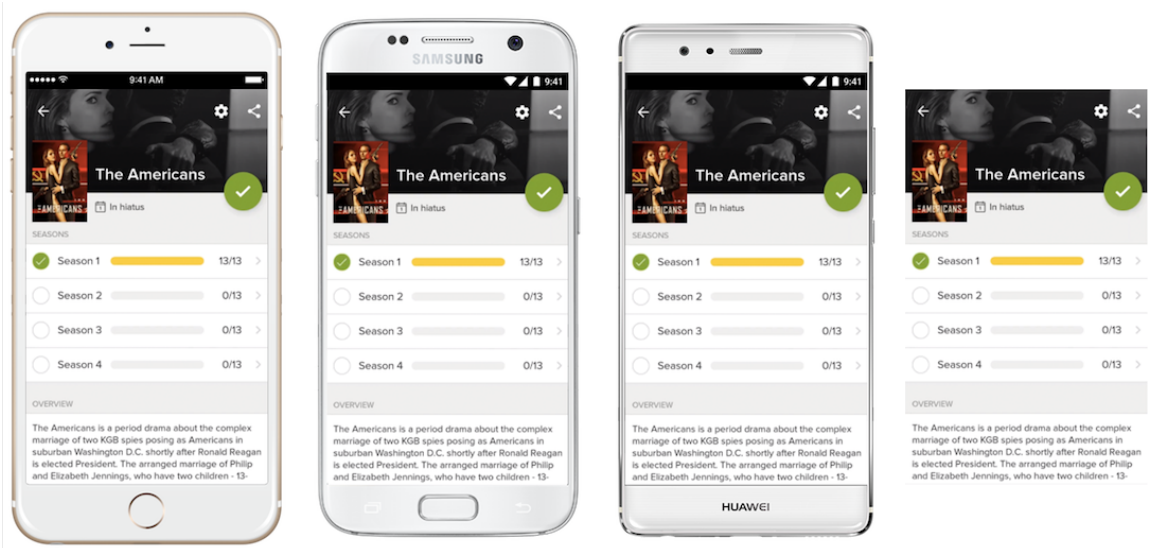

Figure 2 *Stimulus Example for Each Group*

3.3 Measures

Although there are many scales available to measure the reputation of brands, for example in terms of honesty or trustworthiness of brands (Coombs & Holladay, 1996), there was no fitting scale to measure brand usability equity or smartphone brand desirability. Brand usability equity and brand desirability were therefore measured on an eight-item five-point Likert scale (strongly agree - strongly disagree) developed by the researcher. The scale was divided into two subscales; usability equity (four items, α=.98) and brand desirability (four items, α=.96).

The dependent variables were measured on a scale adopted from Laugwitz, Held, & Schrepp (2008), as it is specifically designed as "An end-user questionnaire to measure user experience quickly in a simple and immediate way" (p. 63) whereas most other scales are more focused on usability. The scale measures participant's judgment of the application's

characteristics on a 5-point semantic differential scale. All items were bipolar adjective pairs (e.g. good - bad).

After reduction of the item pool, the following three subscales for both expected and perceived UX were derived from the questionnaire: 'attractiveness', 'usability', and 'novelty'. Cronbach's alphas for the subscales can be found in table 1. The subscale Attractiveness measures a general judgment of the application with 5 items, like 'good' and 'pleasant'. Usability consists of 5 items and measures the user's subjective assessment of the usability of the interface, examples of items are 'understandable' and 'easy to learn'. The subscale 'novelty' is made up out of 3 items measuring qualities like "new" and "innovative".

Table 1 *Cronbach's Alphas for the Subscales of Expected and Perceived UX*

	Expected	**Perceived**
	α	α
Attractiveness	.87	.91
Usability	.72	.83
Novelty	.69	.73

In order to measure 'mistake attribution', four questions were developed by the researchers as there were no appropriate measurements scales available. The questions range from "who is to blame for mistakes made during the interaction" (app-user) to "How likely is it that other users would make the same mistake" (not-very). All questions were based on a five-point Likert scale. After a factor analysis, a three-item construct 'mistake attribution' (α=.75) was created.

3.4 Procedure

After a short explanation of the questionnaire, in which they were told that a new application was being tested, participants were asked if they agreed with the informed consent and if they were able to listen to an audio fragment. If a participant was not able to listen to audio they would be directed to the end of the survey. This was done to ensure that the participants could listen to the comments of the user in the manipulation video. To check if the participants answered the question truthfully an audio fragment containing a two-digit code was played, and the participant was asked what the digits were.

Afterward, a short explanation of the application followed. The participants were told about the name and the specific functions of the app which would be used in the manipulation. They were also asked to inspect the screenshot for at least 10 seconds. Depending on the condition they were assigned to (brand or control), they would be presented a screenshot of an application placed in a phone or a standalone application. The page also contained a short explanation of what the screenshot represented. After this page three more similar pages followed.

Based on the observation of the static visuals, the participants were asked to judge the application's characteristics on a five points bipolar scale. After the expected UX was measured the participants were exposed to a video. The participants were first introduced to the goal of the actions shown in the video, and were asked to make sure their sound was on, and to watch the video in full screen. After a five-second countdown interface, the application (on its own or placed in a phone, again depending on the condition) is shown. The video is 1:26 minutes long. Subsequently, the same scale used to measure expected UX was deployed, this time in order to measure 'perceived UX'.

As noted before, the user in the video intentionally makes a few mistakes while interacting with the interface. These are common mistakes which could reasonably be blamed on either the user or the UI. Depending on the condition assigned to the participant he/she was asked if he/she was aware of the brand of the smartphone used in the research. Following these questions and scales to measure the dependent variables, users were asked about the brand usability equity and brand desirability of the brand of their assigned condition. Finally, users

were asked several participant background questions. They were asked about recent personal (smartphone) brand ownership and satisfaction. They were also asked which device was used to fill in the questionnaire, sex, age, nationality, and education.

3.5 Participants

The questionnaire was distributed through Sona (29%) and social media (71%). Sona is the internal system of the University of Twente in which students can participate in research in return for ECT's (0.25). Participants had to be at least eighteen years old and all the data collection was anonymous. The data was collected in a span of two months between July 26 and September 27.

After the initial shift of incomplete questionnaires 160 participants remained. One Extreme outlier (>3σ) (Utts, 2014) was removed. Participants who took more than 35 minutes were also removed as they were likely interrupted. Finally, a group of 148 participants (table 2) remained (39% male - 61% female). The mean age of the respondents was M = 27, (SD =8,78). The youngest respondent was 18 years old and the oldest respondent 58 years old. The low average age also shows in the fact that 62% of the participants is from the 18-25 age group. 21% of the respondents were lower educated (<Bachelor) and 79% completed or currently follows a higher education (≥Bachelor). 89% of the participant have the Dutch nationality and 10% of the participants have the German nationality. Smartphone brand ownership of Apple (41%) and Samsung (35%) were almost equal, Huawei (4%) and 'other' (20%) made up the rest of the participants.

Table 2 *Descriptive Statistic of Experiment Participants for Each Group*

		Apple		***Samsung***		***Huawei***		***Control***	
N		35		40		36		37	
Sex	Men	11	31%	18	45%	10	28%	18	49%
	Women	24	69%	22	55%	26	72%	19	51%
Nationality	Dutch	30	86%	34	85%	31	86%	34	92%
	Other	5	14%	6	15%	5	14%	3	8%
Age	Mean	27.26		26.18		25.67		27.45	
	SD	10.15		8.32		9.28		7.54	
Education	None – Lower Education	1	3%	3	8%	1	3%	1	3%
	MBO - Associates Degree	6	17%	5	13%	6	17%	8	22%
	Bachelor - Master - PhD	28	80%	31	78%	29	80%	28	75%
	Other			1	3%				
Smartphone Ownership	Apple	12	34%	13	33%	15	42%	21	57%
	Samsung	14	40%	12	30%	12	33%	13	35%
	Huawei	1	3%	2	5%	2	6%	1	3%
	Other	8	23%	13	33%	7	19%	2	6%

4 Results

To test the hypotheses multiple ANOVAs and linear regression analysis were performed using SPSS. This section discusses the results of these analyses. Firstly, ANOVAs were run to determine if there were significant differences between the four groups. Secondly, a repeated measures analysis was run to determine any statistically significant changes between the expected and perceived usability. Lastly, correlation and regression analyses were run for the overall sample and for each group individually.

4.1 Descriptive Statistics and Analyses of Variance

4.1.1 Brand Equity

Descriptive statistics show that Apple scores the highest on the construct usability equity followed by Samsung and Huawei. The same pattern is visible for the construct brand desirability. Huawei scored very close to neutral (3) for usability equity and well below neutral for brand desirability. These results show that the manipulation of brand influenced both the variables usability equity and brand desirability. Descriptive statistics for the independent variables are shown in table 3.

Table 3 *Means and Standard Deviations of the Independent Variables as a Function of Group, Measured on a 5-point Likert Scale*

	Usability Equity		***Brand Desirability***	
	M	*SD*	***M***	*SD*
Apple	**3.77**	0.80	**3.30**	1.07
Samsung	**3.37**	1.04	**3.13**	0.95
Huawei	**3.09**	0.59	**2.29**	0.89
Total	**3.41**	0.88	**2.91**	1.06

To further investigate the differences between groups an analysis of variance was performed. The result showed a statistically significant difference between groups, (F (2, 108) = 5.91, p = .004), for usability equity. A Games-Howell post hoc tests revealed that the score for Apple was significantly higher than that of Huawei (p = .003), but not significantly higher than that of Samsung (p = .148). There was also no significant difference between Samsung and Huawei (p = .320).

An ANOVA for desirability of brand also showed a significant difference between groups (F (2, 108) = 11.28, p = .000). Further exploration by means of a Bonferroni post hoc test shows a statistically significant difference between the desirability of the brand Huawei and that of Apple (p = .000), and Samsung (p = .001). It also showed a non-significant difference between Apple and Samsung (p = 1).

Concluding, the analysis of usability equity showed substantial differences between the brands. Moreover, statically significant differences were found between the brands Apple and Huawei for both usability equity and brand desirability. Therefore, analysis of the independent variables will be performed for these two groups (Apple and Huawei) that show the highest contrast as a sub-selection as well.

4.1.2 Expected UX

Descriptive statistics of expected attractiveness, expected usability, and expected novelty for the different groups can be found in table 4. There are no substantial variations between the groups for either of the constructs. This is supported by ANOVA's for expected attractiveness (F (3,144) = .245, p = .865), usability (F (3,144) = .135, p = .939) and novelty (F (3,144) = 1.435, p = .235). Analysis of expected UX on the group level by means of a Bonferroni post hoc test (for all groups) and t-test (between Apple and Huawei) do not show significant difference either. The lack of substantial differences and the non-significant ANOVA values suggest that manipulation of brand had only marginal influence on participants' expectations of UX.

4.1.3 Perceived UX

Table 4 shows the descriptive statistics of the different groups for perceived attractiveness, perceived usability and perceived novelty. The main result from this table is that Apple scores higher on perceived attractiveness than Samsung (although not statistically significant). All other means of the different measures are fairly similar. ANOVA's for perceived attractiveness (F (3,144) = 2.08, p = .106), usability (F (3,144) = 1.20, p = .311) and novelty (F (3,144) = 0.288, p = .834) support this. Again, a Bonferroni post hoc test (for all groups) and t-test (between Apple and Huawei) showed no significant difference between any groups. These results suggest that, similarly to expected UX, the evaluation of the stimulus material was only marginally influenced by brand. Considering the results of these analyses it is safe to say that the difference between groups for the perceived UX variables are negligible.

Table 4 *Means and Standard Deviations of the Dependent UX Variables as a Function of Group, Measured on a 5-Point Likert Scale*

	Apple		***Samsung***		***Huawei***		***Control***		***Total***	
	M	*SD*	***M***	*SD*	***M***	*SD*	***M***	*SD*	***M***	*SD*
Expected Usability	**4.11**	0.37	**4.13**	0.50	**4.06**	0.65	**4.07**	0.52	**4.09**	0.52
Perceived Usability	**3.78**	0.62	**3.59**	0.69	**3.86**	0.73	**3.84**	0.71	**3.76**	0.69
Expected Attractiveness	**4.02**	0.44	**3.91**	0.59	**3.94**	0.61	**3.95**	0.73	**3.95**	0.60
Perceived Attractiveness	**3.79**	0.64	**3.41**	0.84	**3.67**	0.78	**3.79**	0.82	**3.66**	0.78
Expected Novelty	**3.10**	0.68	**3.19**	0.81	**2.92**	0.77	**3.26**	0.74	**3.12**	0.76
Perceived Novelty	**3.12**	0.75	**3.18**	0.85	**3.13**	0.66	**3.27**	0.76	**3.18**	0.76

4.1.4 Repeated Measures UX

Exploration of the differences between expectations and perceived experience by means of repeated measures showed the greatest reduction between measures for the variable usability in the group of Samsung (M=4.13 vs M=3.59). Significant difference within subjects were found for usability (fig. 3) (F (1, 144) = 38.509, p < 0.0005, η^2=.211) and Attractiveness (fig. 4) (F (1, 144) = 31.320, p < 0.0005, η^2=.179). However, results show no significant differences within subjects for novelty (fig. 5) (F (1, 144) = 1.371, p = 0.244, η^2=.009).

Analysis of the differences in repeated measures between groups for attractiveness (p = .101), usability (p = .098), or novelty (p = .309) showed no statistical significance. Moreover, separately run repeated measure for the subset Apple and Huawei did not reveal statistic significant difference between the two groups for attractiveness (p = .709), usability (p = .410) or novelty (p = .155) either.

Overall it is clear that participants' evaluation of the application's user experience differs significantly between the observation of the still frame and the video. Although Samsung generally shows substantial decrease between expected and perceived variables, there are no statistic significant differences between groups. It is noteworthy that the experiment hardly influenced novelty in any way, whether between groups or between measures.

4.1.5 Mistake Attribution

Descriptive statistics (table 5) show that Apple scores substantially above average and above 3.0 on mistake attribution (meaning users attributed the mistake more to the user). Samsung, on the other hand, scored well below average and below 3.0 (meaning users attributed the mistake to the application) The control and Huawei groups were rated close to average, although both below 3.0.

Furthermore, a one-way ANOVA determined there was a significant difference between groups for the construct mistake attribution (F (3,144) = 2.87, p = .039). However, a Bonferroni post hoc test showed no significant difference between the control group and the brands Apple (p = 1), Samsung (p = .264), and Huawei (p = .965). Neither was there a significant difference between Apple and the brands Samsung (p = .067), or Huawei (p = .325). And neither between Huawei and Samsung (p = 1). When contrasting the ANOVA for the whole sample against a t-test for the groups with statistical significant variance between them (Apple and Huawei), results show a statistically significant difference, t (69) = 2.007, p = .049, between groups for mistake attribution.

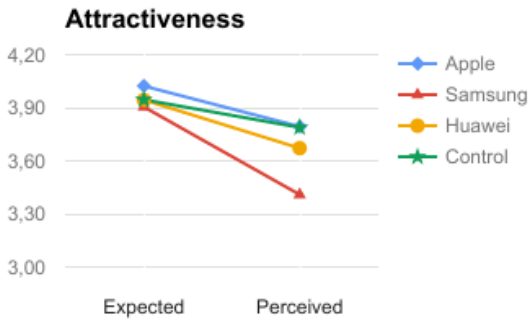

Figure 3 *Graph of Expected and Perceived Attractiveness*

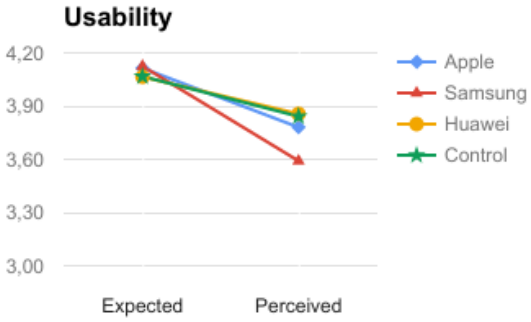

Figure 4 *Graph of Expected and Perceived Usability*

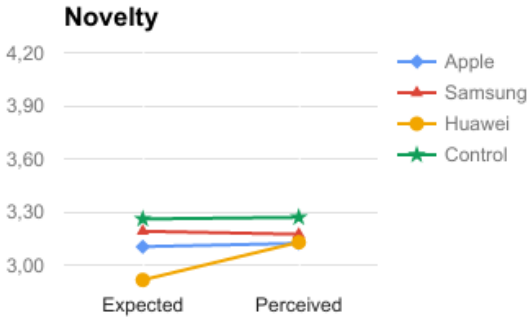

Figure 5 *Graph of Expected and Perceived Novelty*

Table 5 Means and Standard Deviations of the Dependent Variable Mistake Attribution as a Function of Group, Measured on a 5-Point Likert Scale (1-app / 5-user)

	M	SD
Apple	3.09	0.89
Samsung	2.53	0.97
Huawei	2.66	0.91
Control	2.96	0.95
Total	2.80	0.95

The results from the ANOVA and t-test indicate differences between the mistake attribution scores of the different brands. Descriptive statistics support this indication. All the results seem to suggest that the manipulation of brand influences mistake attribution.

4.2 Correlation & Regression Analyses

The performed ANOVAs examined the variables on the group level which can obscure the mechanisms and relationship for the subjects in these groups. To investigate the relationship between the dependent and independent variables correlation and regression analyses were performed.

4.2.1 Correlation Analysis Usability Equity

A correlation analysis (Figure 6) showed that there was a significant effect of usability equity, on perceived usability (p = .029). Moreover, it showed a significant effect of usability equity on perceived attractiveness (p = .036), perceived usability (p = .050) and on mistake attribution (p = .011). These results make it clear that the usability equity of brand has statistically significant relations with many of the dependent variables. Therefore, they tentatively support hypotheses H1a, H2a, and H3a.

4.2.2 Correlation Analysis Brand Desirability

Figure 7 shows the results of a correlation analysis with brand desirability as the independent variable. In contrast to the independent variable usability equity, brand desirability only shows a statistically significant relation with expected novelty (p =.050) with no other significant effects. Support for hypotheses H1b, H2b or H3b is not provided by these results.

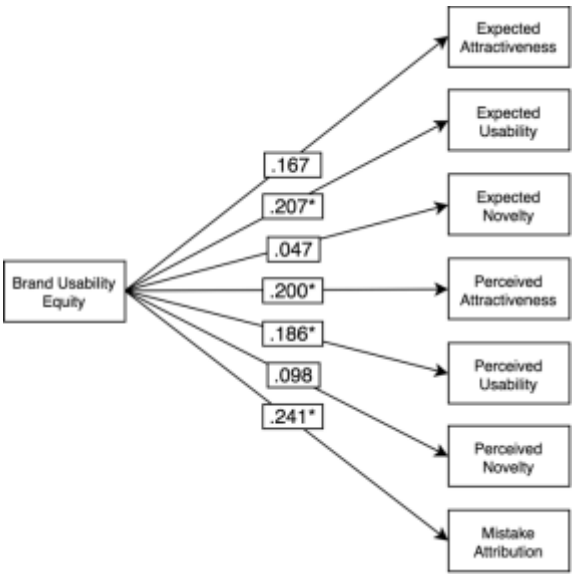

Figure 6 *Regression analysis for usability equity*
**=significant at the .05 level*

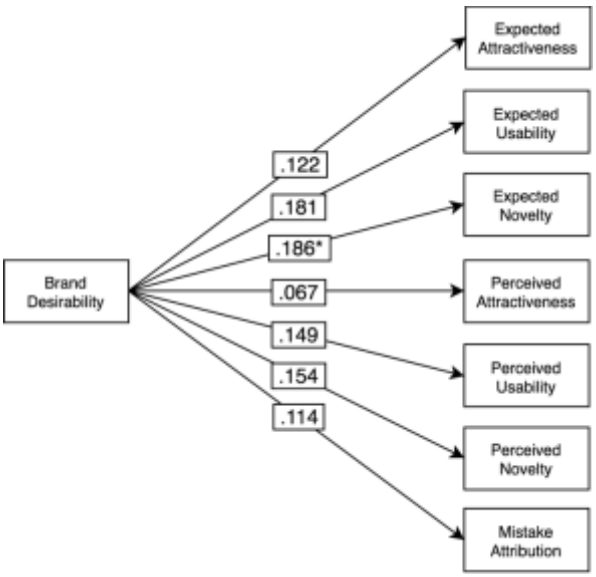

Figure 7 *Regression analysis for brand desirability*
**=significant at the .05 level*

4.2.3 Correlation Analysis for Each Group

Separate correlation analyses for each group (table 6) revealed that Apple and Huawei do not have a substantial amount of significant correlations. Apple showed no significant correlations at all and Huawei only between desirability and perceived usability. Samsung showed seven significant relationships however; four for usability equity and three for desirability. The large number of significant relations seem to suggest that the extent to which a brand influences UX differs substantially between brands.

Table 6 *Pearson Correlation Coefficients between the Main Variables of the Study for Each Group*
*** Significant at the .05 Level **Significant at the .005 Level*

		Apple		***Samsung***		***Huawei***	
		Usability Equity	*Desirability*	*Usability Equity*	*Desirability*	*Usability Equity*	*Desirability*
Expected Attractiveness	r	-.068	.163	.289	.195	.141	.013
Perceived Attractiveness	r	-.109	.126	.344*	.058	.191	.079
Expected Usability	r	.094	.127	.312*	.319*	.185	.099
Perceived Usability	r	-.037	.179	.325*	.123	.292	.353*
Expected Novelty	r	-326	.009	.247	.365*	-.041	.013
Perceived Novelty	r	-224	.041	.394*	.455**	-122	-.108
Mistake Attribution	r	-.034	-.107	.306	.103	.272	.266

4.2.4 Regression Analyses

Table 7 shows the result of a regression analysis with usability equity and brand desirability as the independent factors. The results indicate that the significant correlations found are relatively weak as the only model with significant regression is that of mistake attribution. However, individual significant relations can still be found between brand desirability and expected novelty and between usability equity and perceived attractiveness, and mistake attribution.

Taking the outcome of the correlation and linear regression analysis in consideration the hypotheses which state that brand desirability influences expected and perceived UX (H1b, H2b) can both be safely rejected. The expectation that higher usability equity of smartphone brands leads to higher UX expectations (H1a) is not met: regression analysis showed no statically significance for any of the subscales and correlation analysis only showed one for expected usability. As a result hypothesis H1a is also rejected.

The influence of usability equity on perceived UX is less clear, significant correlations were found for all subscales but regression analysis only shows statistical significance for the subscale perceived attractiveness. Although there are significant correlations between the variables, the regression models do not support the hypothesis unequivocally. Hypothesis 2a is therefore rejected.

Table 7 shows that the model with usability equity and brand desirability is capable of partly explaining mistake attribution. As mentioned earlier, the correlation analysis revealed a significant correlation between usability equity and mistake attribution as well. Hypothesis 3a can therefore be accepted. However, correlation analysis did not support hypothesis 3b and the model does not show a statistically significant linear regression for brand desirability either, hypothesis 3b is therefore rejected.

Further exploration of the data was performed by running regression analysis for each group separately. Table 8 shows an overview of the results. Notable is that the group of Samsung shows multiple significant linear regression whereas Huawei showed none and Apple only one (expected novelty). Moreover, all of Samsung's significant results are for the subscales of perceived UX. With the strongest results showing for perceived attractiveness and perceived usability. This indicates that the perceived UX of Samsung can be significantly influenced by usability equity.

Table** 7 Result of the Linear Regression Analysis for Each Dependent Variable with Usability Equity and Brand Desirability as Independent Variables ** Significant at the .05 Level*

	B	***T***	***P***
Expected Attractiveness R^2 = .028			.216
Usability Equity	.105	1.208	.230
Brand Desirability	.000	0.003	.998
Expected Usability R^2 = .045			.083
Usability Equity	.094	1.173	.243
Brand Desirability	.031	0.469	.640
Expected Novelty R^2 = .051			.058
Usability Equity	-.162	-1.370	.173
Brand Desirability	.230	2.362	.020*
Perceived Attractiveness R^2 = .053			.053
Usability Equity	.282	2.348	.021*
Brand Desirability	-.120	-1.216	.227
Perceived Usability R^2 = .035			.146
Usability Equity	.130	1.204	.231
Brand Desirability	.018	0.204	.839
Perceived Novelty R^2 = .024			.268
Usability Equity	-.025	-0.207	.836
Brand Desirability	.125	1.264	.209
Mistake attribution R^2 = .066			.025*
Usability Equity	.362	2.476	.015*
Brand Desirability	-.116	-0.959	.340

Table 8 *Result of the Linear Regression Analysis for Each Dependent Variable with Usability Equity and Brand Desirability as Independent Variables Split for Each Brand.* ******* *Significant at the .05 Level* ******** *Significant at the .005 Level*

	Apple				***Samsung***				***Huawei***			
	B	T	**P**	R^2	B	T	P	R^2	B	T	**P**	R^2
Expected Attractiveness			.282	.076			.173	.091			.514	.040
Usability Equity	-.159	-1.310	.200		.235	1.463	.152		.311	1.070	.293	
Brand Desirability	.142	1.573	.126		-.094	-0.538	.594		-.061	-0.319	.752	
Expected Usability			.767	.016			.119	.109			.559	.035
Usability Equity	.011	0.099	.921		.072	0.530	.599		.223	0.920	.364	
Brand Desirability	.039	0.495	.624		.102	0.690	.494		-.022	-0.135	.893	
Expected Novelty			.038*	.185			.056	.144			.934	.004
Usability Equity	-.470	-2.695	.011*		-.148	-0.688	.496		-.107	-0.363	.719	
Brand Desirability	.229	1.758	.088		.444	1.894	.066		.056	0.287	.776	
Perceived Attractiveness			.281	.076			.002**	.292			.514	.040
Usability Equity	-.253	-1.466	.158		.787	3.882	.000**		.311	1.070	.293	
Brand Desirability	.195	1.492	.146		-.664	-3.009	.005**		-.061	-0.319	.752	
Perceived Usability			312	.070			.027*	178			.096	.132
Usability Equity	-.197	-1.147	.260		.490	2.207	.010*		.142	0.544	.590	
Brand Desirability	.197	1.539	.134		-.356	-1.806	.079		.231	1.339	.190	
Perceived Novelty			165	.106			.014*	.208			.760	.016
Usability Equity	-.395	-0.420	.062		.039	0.178	.860		-.102	-0.090	.689	
Brand Desirability	.216	0.380	.165		.370	1.563	.127		.038	-0.051	.822	
Mistake attribution			.805	.013			.609	.030			.216	.089
Usability Equity	.064	0.255	.801		.231	1.002	.324		.269	0.811	.423	
Brand Desirability	-.119	-0.633	.531		-.088	-0.578	.567		.158	0.722	.475	

5 Discussion

The study aimed to explore the influence of brand equity on user experience by investigating the effect of the independent variables usability equity and brand desirability on the dependent variables expected UX, perceived UX and mistake attribution. The findings of the study are described in the following section, followed by the implications of these findings and the limitations of the research and lastly the suggestions for future studies.

5.1 Summary of Findings

Examining the previously presented results it can be concluded that brand usability equity and brand desirability generally do not significantly influence UX. This negatively answers the main research question; whether smartphone brand equity influences UX. Although significant correlations were found between various variables, there is no consistent agreement between the results when further examined by means of correlation analysis for each group or linear regressions. An exception to this is the influence of usability equity on mistake attribution, both correlation analysis and regression analysis show significant results.

Descriptive statistics reveal substantial differences for the independent variables. However, the dependent variables show no substantial variations between the groups for either of the constructs. A repeated measures analysis does show significant differences before and after observation of the video for usability and attractiveness, with Samsung showing the greatest reductions. This might be explained by the fact that the relatively weak UX observed in the video is confirming an existing stereotype (e.g. lack of usability).

The control group scored relatively high overall which might be a result of a 'deficiency compensation' effect. Sauer and Sonderegger (2009) explained the phenomenon as compensation for the lack of polish. When participants rate a low fidelity prototype, they might have "mentally anticipated of what the real appliance might look like and employed this mental picture as a basis for their rating" (p. 670), resulting in scores which are similar to a full polished prototype.

Overall the results suggest that the experiment successfully influenced participants experience of the application. It has to be noted that the variance between independent variables were often not significantly different. And that the experiment hardly influenced the dependent variable novelty in any way. It is possible that judgment of the novelty of an app immediately gets made based on a description of the functionality of the app and that brand, images or videos do not change this judgment.

The lack of contrast between the groups on the independent variables makes it harder to compare groups against each other on the dependent variables. Moreover, even when contrasting the two groups on the outside of the spectrum (i.e. Apple & Huawei), analysis hardly produces substantial amount of significant differences on the scores of the independent variables. A t-test for mistake attribution did reveal a significant difference however.

Examination of the linear regression between usability equity and the dependent variables show no statically significance for any of the expected UX subscales and correlation analysis only showed one for expected usability. Usability equity does show significant relations for all perceived UX subscales however. Moreover, it showed a significant result for the regression model that includes brand desirability for the subscale perceived attractiveness. These results seem to suggest that usability equity has a stronger influence on UX measures after the participants had the chance to observe many of the factors that are part of UX in play, like the interaction design of an application.

Investigation of brand desirability only showed one significant relation between desirability and the subscale expected novelty. Even though the results were significant for

both correlation and regression analysis, it can be asserted that desirability does not significantly influence expected or perceived UX as a whole.

It is interesting to note that Huawei scored substantially lower on brand desirability compared to usability equity. An explanation might be that desirability is inherently linked with awareness. Given Huawei's position in the smartphone market it is expected that people do not really desire the brand; after all, people do not desire a brand or product they are not familiar with. The lack of awareness of a brand might also explain the score close to neutral on usability equity: respondents that are not aware of a brand are likely to avoid extreme answers as they are not able to evaluate its reputation.

Besides the significant correlations between usability equity and perceived UX it can also be concluded that brand equity has a significant influence on mistake attribution. Significant differences between groups for mistake attribution were found, and correlation analysis and a linear regression model with usability equity and brand desirability show that the model is capable of partly explaining mistake attribution. Although research shows that mistake attribution can be influenced trough believes about the ease of use of products (Karsh & Scanlon, 2007), it is still interesting to see that the mistake attribution is significantly depending on brand equity. When mistakes were observed on a Samsung phone they were directed substantially more towards the app. On the other hand, mistakes observed on Apple's phones were blamed on the user. This might in part be explained by cognitive dissonance between the mistakes made and Apple's reputation for UX; people might have dismissed the seriousness of the mistake or might have simply blamed the application, as this would eliminate the dissonance completely.

The differences between groups also show in the results of a correlation analysis for each separate group; Samsung shows a substantial number of correlations (seven) between the independent and depended variables whereas others show only one or none. The group of Samsung also shows multiple significant linear regression for the subscales of perceived UX. Overall, it seems that of the three brands, Samsung has the most influence on perceptions. This might indicate that the effect of brand equity is moderated by one or multiple other variables. In the case of Huawei, a variable like awareness will probably strongly moderate the influence of the independent variables on the dependent ones.

5.2 Practical Implications

A few things that have come to light are not only important for its theoretical consequences but also for researchers and developers of applications. First of all, it is advised that brand equity is taken into account when performing UX tests. This might be the case for simple interface branding (e.g. status bar) but is mainly the case when the test is depicting devices showing forms of branding. It might not substantially influence specific usability concept relationships like attractiveness-usability which Quinn and Tran (2010) argue in their research, but the results show that it does affect certain individual concepts which are part of UX.

Since the control group scored consistently high and did not show large differences in repeated measures (between manipulations) it might be wise to omit a depiction of hardware when performing usability tests on a different medium than the device self (e.g. virtual, on paper). Moreover, it might make it easier to compare scores over time and between test as there is no hardware depiction influencing the result. It has to be noted that omitting hardware might not be easy as it is currently often part of the interaction design (e.g. hardware buttons).

In contrast to the advice for researchers, it would be beneficial for organizations to take advantage of the influence of brand. They should take their target audience into account and use the brands that have the best reputation among their target audience to capitalize on their

predisposition, for example when designing marketing materials. Organizations should also consider this when launching their software products in order to yield better reviews and create a better brand reputation. Target audience encompasses more than just consumers however. The choice of prototype is also of importance when it is being demonstrated to clients (Sauer & Sonderegger, 2009).

In conclusion, in certain cases brand equity influences the perception of users and should, therefore, be taken into account when conducting UX test. Besides influencing the general construct of UX, it also influences attribution of mistake, something which is especially important for new technologies. Moreover, these findings should be taken into account by application developers who want to advertise their application, as the choice of mobile brand setting alone can influence people's expectations.

5.3 Theoretical Implications

The main goal of this study was to examine the influence of smartphone brand equity on UX. The fierce competition in the smartphone ecosystem and the shift from the computers and browsers to smartphone and applications make good UX more important than ever. Generally, it is clear that brand equity influences concepts like perceived product quality (Rao & Monroe, 1989), consumer trust (Casalo, Flavián, & Guinalíu, 2007) and product preferences (McGale, Halford, Harrold, & Boyland, 2016). And research from Keijzers et al. (2008) even shows that UX can differ significantly between brands even when running the same operating system. However, this study tried to examine the influence of smartphone brand equity on UX of third-party applications in particular. The result shows some inconsistent results and as a result of that some hypotheses could be accepted for one brand and rejected for the other. It is therefore advised to further investigate this these concepts in future studies. However, it is shown that brand equity can influence the UX of third-party application. In addition, this study also gives new insight into mistake attribution. Therefore, this study provides new information regarding the influence of brand equity on third-party applications.

5.4 Limitations

This study had several limitations, the main limit was that it did not use real devices as a manipulation but rather virtual representations. Future research incorporating actual physical devices is needed in order examine if real devices elicit stronger emotional responses compared to the virtual ones used in this research. It should also be investigated if this would increase the feeling of connection between the device brand and application. It would be useful to know if this actually leads to increased emotional response and feeling of connection and if so, what the influence is on UX of third-party applications and mistake attribution. Moreover, using a physical device to let the user interact with the interface would allow the researcher to measure the influence on objective usability measures and on perceived UX after interaction with the interface by the participants themselves.

Since the manipulations were performed using images and videos showing (the interaction with) the interface, the measure mistake attribution asked participants to blame either the user in the video or the application. The downside of this approach is that the participants might be influenced by their image of the person interacting with the device. They might have had low expectations of the user because of a perceived lack of skill in using technology for example. Or if older people imagined that a young person was interacting with device, they might have reasoned that if even they make mistakes, it must be the application that is really hard to use.

A possible confounding factor is the use of different hardware depictions. It is hard to find a solution for this as a blank phone without branding would exclude some brands immediately; a phone without buttons on the front for example, cannot possibly be an Apple device. To mitigate these effects phones were used that were very similar (colour, size, screen size, overall design). However, this cannot completely eliminate it as a possible confounding factor. Another possible confounding factor is that the participants might have known the application beforehand. Although chances are very small, there were only +- 2 million Android installations as of October 2016, it is still possible that some participants had previous experience and therefore already formed an opinion of the application.

5.5 Future Research

To get more robust results future research should include brand awareness measures. Measuring this might give more insight into the effects of brand awareness on UX ratings and could have possibly confirmed the theory for the neutral score on usability equity. Insight into the effect of brand awareness would also be valuable for brands that enter new markets or researchers who need to use real devices but want to avoid popular brands.

This research could have yielded better results if the brand used in the conditions were more clearly communicated. The brand could have been mentioned in the guiding texts or more prominently on the devices themselves. This has to be done with caution since too much focus would make it clear that the brand is the manipulating factor. The iPhone used in this research did not show a brand name for example, since iPhones never have brand names on the front face of the phone, and would immediately raise attention.

Further measures to improve reliability, validity, and sensitivity would be the use of UX scales which are more widely validated in different conditions, and the use of a seven-point bipolar scale for the UX measures. This research made use of a five-point scale version to ensure compatibility across devices, the downside however, is that it increases the effects of central tendency bias compared to a seven-point scale. Lastly, future research could examine if it is general usability equity that influences mistake attribution or if there are more specific concepts that can be identified, like brand reputation regarding the stability of applications.

5.6 Conclusion

In conclusion, this research shows that the brand equity of hardware manufacturer does generally not extend to the third-party applications running on its devices, and as a result hardly influences the UX of these applications. However, usability equity does show marginal correlations with perceived UX and it affected the attribution of mistakes. Brand Desirability, on the other hand, does not seem to influence UX or mistake attribution in any significant way. The fact that the Samsung group showed much stronger relations between the variables, suggests that the extent to which smartphone brand equity influences UX depends on the smartphone brand.

The research was mostly limited by using virtual representations of the devices which did not allow for actual usability tests and might not have elicited strong responses like a physical device might have elicited. The lack of awareness of certain brands possibly influenced measures like usability equity and brand desirability. It is therefore advised to include an awareness measure in future research. This research shows that if possible, organizations should use brands for which their audience are most susceptible to maximize positive UX. UX researchers should consider taking brand equity into account when performing UX tests as it could influence test results for certain brands and they should further investigate brand equity's possible place in UX to bolster UX models.

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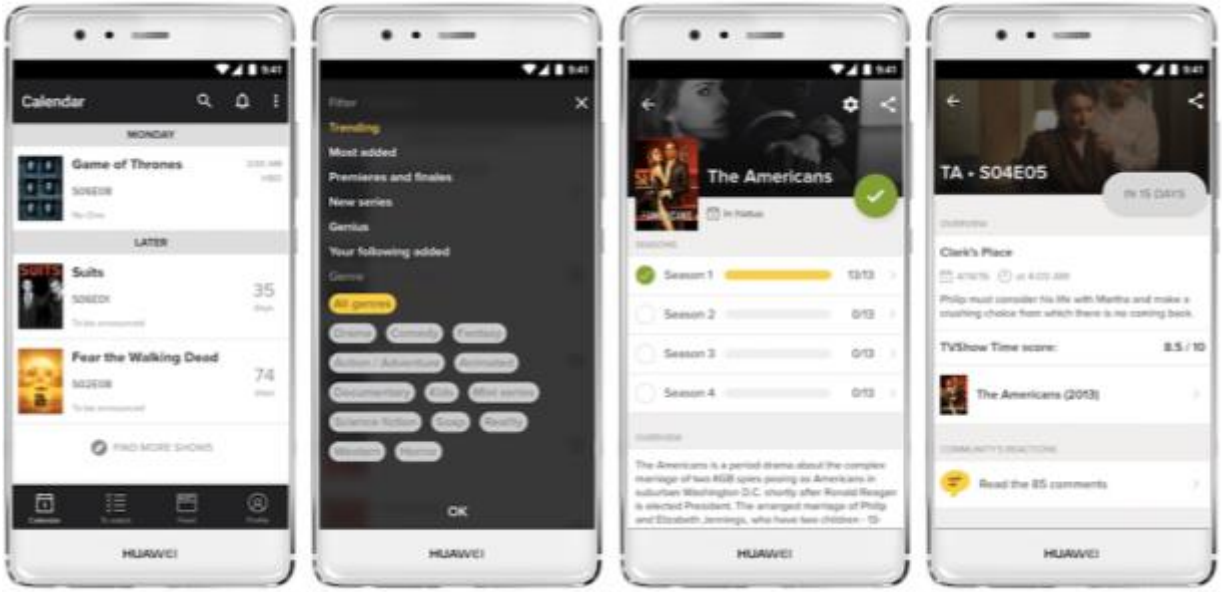
Appendices

Appendix A: Visuals

The 4 different static visuals shown in the questionnaire (Huawei condition).



Appendix B: Questionnaire

Geachte heer, mevrouw,

Hartelijk dank voor uw bereidheid om mee te werken aan mijn onderzoek. In dit onderzoek ben ik geïnteresseerd in de mening van gebruikers over een nieuw ontwikkelde app voor smartphones.
U krijgt informatie over de app, waarna u om uw mening wordt gevraagd. Er zijn geen goede of foute antwoorden, zolang uw antwoord maar weergeeft wat uw mening is. De vragenlijst zal geheel anoniem worden verwerkt.
Houd er rekening mee dat de vragenlijst gebruikt maakt van audio. Zorg er alstublieft voor dat u in de gelegenheid bent om hiernaar te luisteren.
Deelname aan dit onderzoek neemt ongeveer 8-12 minuten in beslag. Probeer de vragenlijst af te ronden in één sessie.

Jordi Ebbing
Master student Technical Communication - University of Twente

QID46
Ik verklaar op een voor mij duidelijke wijze te zijn ingelicht over de aard, methode, doel en belasting van het onderzoek. Ik weet dat de gegevens en resultaten van het onderzoek alleen anoniem en vertrouwelijk aan derden bekend gemaakt zullen worden. Mijn vragen zijn naar tevredenheid beantwoord. Ik stem geheel vrijwillig in met deelname aan dit onderzoek. Ik behoud me daarbij het recht voor om op elk moment zonder opgaaf van redenen mijn deelname aan dit onderzoek te beëindigen.

- ❍ Ik ga akkoord

QID41 Heeft u op dit moment de mogelijkheid om naar audio te luisteren?

- ❍ Ja
- ❍ Nee, ik kom later terug om de enquête verder in te vullen.

QID134 Zorg er alstublieft voor dat u in staat bent om naar audio te luisteren. Dit kunt u doen door het volume te verhogen of door gebruik te maken van oordopjes. Bent u nu in staat om naar audio te luisteren?

- ❍ Ja
- ❍ Nee, ik vul de enquête op een later moment in.

QID62 Speel alstublieft het bovenstaande fragment af zodat uw audio getest kan worden. Vul het nummer dat u heeft gehoord hieronder in.

QID6 De app op de volgende pagina's heet "TVShow Time". Met de app kunt u uw favoriete series volgen, bijhouden welke afleveringen u al gezien heeft en zien wanneer de volgende aflevering wordt uitgezonden. Het doel in dit voorbeeld is om een nieuwe serie toe te voegen en er achter te komen wanneer de eerstvolgende aflevering wordt uitgezonden. Op de volgende schermen vindt u vier schermafbeeldingen van de app. Bestudeer de afbeeldingen rekening houdende met het doel van de app. Bestudeer de afbeeldingen elk voor minstens 10 seconden.

QID86 Hieronder vindt u een video van de app in gebruik. Het doel in dit voorbeeld is om een tv serie toe te voegen aan de lijst met series die de gebruiker volgt en om erachter te komen wanneer de volgende aflevering wordt uitgezonden.
Exposure to a visual of one of the four conditions

QID78 Het volgende scherm geeft een overzicht van de labels en sorteer opties die gebruikt kunnen worden om de zoekresultaten te filteren.
Exposure to a visual of one of the four conditions

QID127 Het volgende scherm geeft een specifieke serie weer met een overzicht van zowel afleveringen die bekeken zijn als de afleveringen die nog bekeken moeten worden.
Exposure to a visual of one of the four conditions

QID129 Het volgende scherm geeft een specifieke aflevering weer met informatie wanneer deze wordt uitgezonden.
Exposure to a visual of one of the four conditions

QID69 Beoordeel de app op basis van de schermafbeeldingen, u kunt gebruik maken van halve sterren.

QID91 Geef alstublieft aan wat u van de app vindt. Probeer zo spontaan mogelijk de lijst in te vullen. Wacht dus niet te lang met uw keuze, zodat de antwoorden zo dicht mogelijk bij uw oorspronkelijke indruk van het product liggen.

	1	2	3	4	6
verwarrend:overzichtelijk	❍	❍	❍	❍	❍
afstotend:aantrekkelijk	❍	❍	❍	❍	❍
makkelijk te leren:moeilijk te leren	❍	❍	❍	❍	❍
begrijpelijk:onbegrijpelijk	❍	❍	❍	❍	❍

QID94

	1	2	3	4	5
nieuw:gebruikelijk	❍	❍	❍	❍	❍
saai:creatief	❍	❍	❍	❍	❍
innovatief:conservatief	❍	❍	❍	❍	❍
conventioneel:origineel	❍	❍	❍	❍	❍

QID96

	1	2	3	4	5
demotiverend:motiverend	❍	❍	❍	❍	❍
spannend:vervelend	❍	❍	❍	❍	❍
inefficiënt:efficiënt	❍	❍	❍	❍	❍
interessant:oninteressant	❍	❍	❍	❍	❍
onvoorspelbaar:voorspelbaar	❍	❍	❍	❍	❍

QID97

	1	2	3	4	5
belemmerend:ondersteunend	❍	❍	❍	❍	❍
volgens verwachtingen :niet volgens verwachtingen	❍	❍	❍	❍	❍
inferieur:waardevol	❍	❍	❍	❍	❍
vertrouwd:niet vertrouwd	❍	❍	❍	❍	❍
onpraktisch:praktisch	❍	❍	❍	❍	❍

QID98

	1	2	3	4	5
aardig:onaardig	❍	❍	❍	❍	❍
langzaam:snel	❍	❍	❍	❍	❍
ordelijk:rommelig	❍	❍	❍	❍	❍
onaangenaam:aangenaam	❍	❍	❍	❍	❍

QID104

	1	2	3	4	5
plezierig:onplezierig	❍	❍	❍	❍	❍
goed:slecht	❍	❍	❍	❍	❍
aantrekkelijk:onaantrekkelijk	❍	❍	❍	❍	❍
complex:eenvoudig	❍	❍	❍	❍	❍

QID82 Hieronder vindt u een video van de app in gebruik. Het doel in dit voorbeeld is om een tv serie toe te voegen aan de lijst met series die de gebruiker volgt en om erachter te komen wanneer de volgende aflevering wordt uitgezonden. Zorg ervoor dat uw geluid aan staat en dat u de video in volledig scherm bekijkt.
Exposure to a video of one of the four conditions

QID49 Beoordeel de app op basis van de schermafbeeldingen, u kunt gebruik maken van halve sterren.

QID105 Geef alstublieft aan wat u van de app vindt. Probeer zo spontaan mogelijk de lijst in te vullen. Wacht dus niet te lang met uw keuze, zodat de antwoorden zo dicht mogelijk bij uw oorspronkelijke indruk van het product liggen.

	1	2	3	4	6
verwarrend:overzichtelijk	❍	❍	❍	❍	❍
afstotend:aantrekkelijk	❍	❍	❍	❍	❍
makkelijk te leren:moeilijk te leren	❍	❍	❍	❍	❍
begrijpelijk:onbegrijpelijk	❍	❍	❍	❍	❍

QID106

	1	2	3	4	5
nieuw:gebruikelijk	❍	❍	❍	❍	❍
saai:creatief	❍	❍	❍	❍	❍
innovatief:conservatief	❍	❍	❍	❍	❍
conventioneel:origineel	❍	❍	❍	❍	❍

QID107

	1	2	3	4	5
demotiverend:motiverend	❍	❍	❍	❍	❍
spannend:vervelend	❍	❍	❍	❍	❍
inefficiënt:efficiënt	❍	❍	❍	❍	❍
interessant:oninteressant	❍	❍	❍	❍	❍
onvoorspelbaar:voorspelbaar	❍	❍	❍	❍	❍

QID108

	1	2	3	4	5
belemmerend:ondersteunend	❍	❍	❍	❍	❍
volgens verwachtingen :niet volgens verwachtingen	❍	❍	❍	❍	❍
inferieur:waardevol	❍	❍	❍	❍	❍
vertrouwd:niet vertrouwd	❍	❍	❍	❍	❍
onpraktisch:praktisch	❍	❍	❍	❍	❍

QID109

	1	2	3	4	5
aardig:onaardig	❍	❍	❍	❍	❍
langzaam:snel	❍	❍	❍	❍	❍
ordelijk:rommelig	❍	❍	❍	❍	❍
onaangenaam:aangenaam	❍	❍	❍	❍	❍

QID110

	1	2	3	4	5
plezierig:onplezierig	❍	❍	❍	❍	❍
goed:slecht	❍	❍	❍	❍	❍
aantrekkelijk:onaantrekkelijk	❍	❍	❍	❍	❍
complex:eenvoudig	❍	❍	❍	❍	❍

QID39 De fouten gemaakt in de video zijn de schuld van de...

	1	2	3	4	5
App:Gebruiker	❍	❍	❍	❍	❍

QID131 Hoe serieus zijn de problemen die je in de video zag?
- ❍ Bijzonder serieus
- ❍ Heel serieus
- ❍ Matig serieus
- ❍ Enigszins serieus
- ❍ Niet serieus

QID132 Hoe waarschijnlijk acht je het dat anderen dezelfde fout(en) zullen maken?
- ❍ Bijzonder waarschijnlijk
- ❍ Eerder waarschijnlijk
- ❍ Noch waarschijnlijk noch onwaarschijnlijk
- ❍ Eerder onwaarschijnlijk
- ❍ Totaal onwaarschijnlijk

QID133 De ontwikkelaar van de app moet de app aanpassen om deze fouten te voorkomen.
- ❍ Helemaal mee eens
- ❍ Enigszins mee eens
- ❍ Noch eens noch oneens
- ❍ Eerder oneens
- ❍ Helemaal niet mee eens

QID51 Weet je het merk van de smartphone die gebruikt is in de afbeeldingen en video
- ❍ Ja
- ❍ Nee

QID17 Vul de naam van het merk in

QID52 Kies het merk welke u denkt dat gebruikt is in de video en afbeeldingen.
- ❍ Iphone
- ❍ Samsung
- ❍ Huawei
- ❍ LG
- ❍ HTC
- ❍ Microsoft
- ❍ Weet niet
- ❍ Anders

QID53 Hoe zeker bent u hier van?
- ❍ Onzeker
- ❍ Enigzins onzeker
- ❍ Enigzins zeker
- ❍ Zeker

QID137 De volgende vragen zijn omtrent het merk X. Beoordeel smartphones van dit merk (e.g. X) op de volgende punten:

	Helemaal niet mee eens	Enigszins mee oneens	Noch eens noch oneens	Enigszins mee eens	Helemaal mee eens
Telefoons van dit merk zijn van hoge kwaliteit	❍	❍	❍	❍	❍
Telefoons van dit merk zijn mooi	❍	❍	❍	❍	❍
Telefoons van dit merk zijn makkelijk in gebruik	❍	❍	❍	❍	❍
Apps op hun telefoons zijn mooi.	❍	❍	❍	❍	❍
Apps op hun telefoons zijn makkelijk in gebruik	❍	❍	❍	❍	❍
Apps op hun telefoons zijn van hoge kwaliteit	❍	❍	❍	❍	❍
Telefoons van dit merk zijn cool	❍	❍	❍	❍	❍
Telefoons van dit merk zijn een statussymbool	❍	❍	❍	❍	❍
Ik zou graag een telefoon van dit merk willen hebben	❍	❍	❍	❍	❍
Dit merk is een statussymbool	❍	❍	❍	❍	❍
Dit merk is cool	❍	❍	❍	❍	❍
Ik zou graag producten van dit merk willen hebben	❍	❍	❍	❍	❍

QID36 Van welk van de volgende merken bezit u producten?
- ❑ Samsung
- ❑ Apple
- ❑ Huawei
- ❑ Geen van bovenstaande

QID20 Van welk van de volgende merken heeft u smartphones in het bezit gehad? Kies de drie meest recentelijk (max. 3).
- ❑ Apple
- ❑ Samsung
- ❑ Huawei
- ❑ LG
- ❑ HTC
- ❑ Motorola
- ❑ Microsoft (Lumia)
- ❑ Anders _____
- ❑ Geen van bovenstaande

QID57 Wat is het merk van uw huidige persoonlijke smarpthone
- ❍ Anders _____

QID21 Hoe tevreden bent u met uw smartphone?
- ❍ Totaal tevreden
- ❍ Eerder tevreden
- ❍ Noch tevreden, noch ontevreden
- ❍ Eerder ontevreden
- ❍ Totaal ontevreden

QID56 Ik heb deze enquête beantwoord op mijn:
- ❍ Smartphone
- ❍ Tablet
- ❍ Laptop/PC
- ❍ Anders _____

QID1 Wat is uw geslacht?
- ❍ Man
- ❍ Vrouw

QID29 Wat is uw leeftijd?

QID54 Wat is uw nationaliteit?
- ❍ Nederlands
- ❍ Anders _____

QID30 Wat is uw hoogst genoten opleiding?

- ❍ Geen - Basisschool - Middelbaar
- ❍ MBO - Associates Degree
- ❍ Bachelor - Master - PhD
- ❍ Anders _____