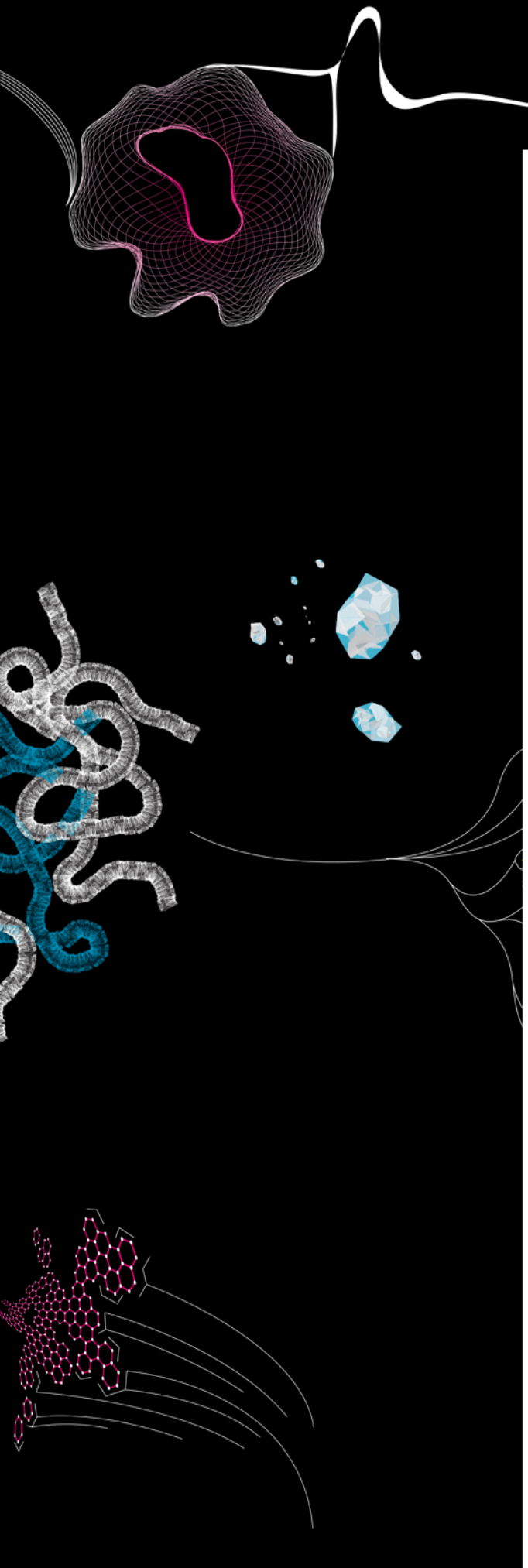


MASTER THESIS

# NUDGING USERS INTO INNOVATIVE TECHNOLOGY: THE INTERACTION OF CULTURE AND CONTENT DESIGN ON ACCEPTING AN ANTI-THEFT DEVICE FOR BICYCLES

CYNTHIA YIN CHEN

UNIVERSITY OF TWENTE.

**Student number**: 1907492

**Programme**: Communication Studies

**Track**: Marketing Communication

**Supervisor**: Dr. Joyce Karreman

**Second Reader**: Qian Li, MSc

**Faculty**: Behavioural Management and Social Sciences

**Date**: 29-01-2019

**Place**: Enschede, The Netherlands

## Abstract

**Purpose -** Consumers often show some resistance when introduced to an innovative tech product. This study aims to investigate to what extent the fit between consumers' cultural attribute and two types of content design elements in the advertising will lead to a higher acceptance towards the product.

**Design/Methodology –** A 2 (message framing: gain vs. loss) × 2 (layout design: analytic vs. holistic) × 2 (cultural groups: Western European vs. Chinese) between-subjects experiment was conducted. A total of 238 participants, 117 from the Greater China Region and 121 from Western Europe participated in the desktop-based online survey, with which participants' perceptions on the infographics are collected and measured.

**Findings** – Gain-framed messages increase people's willingness to try the innovative product, regardless of their cultural backgrounds. Chinese participants showed greater intention to try the innovative product compared to their western counterparts. Higher message comprehension, higher visual satisfaction, greater perceived information value, and greater willingness to try are observed, when information is organised in analytic layout for Western Europeans, and when information is organised in holistic layout for Chinese.

**Conclusion** – The fit between message framing and dominant regulatory focus of a specific culture contributes to the message comprehension, yet not on the persuasiveness of the product information. The match between layout and cultural groups' cognitive styles is more robust and impactful in the perception of the advertisement, including message comprehension and visual satisfaction; and in the persuasiveness of the product information, including perceived information value and willingness to try the innovative tech product.


***Keywords:*** *technology acceptance, message framing, layout design, Western European, Chinese, dominant regulatory focus, cultural cognitive styles, anti-theft device for bicycles*

# Table of Contents

# 1 Introduction

The Netherlands is known for its bike culture. While a bike can bring much convenience and fun to people's daily life, it also carries the risk of being stolen. According to a study conducted by Central Bureau of Statistics (CBS) of the Netherlands, Enschede is ranked the first for the Dutch city with the highest number of stolen bikes reported - three bikes on average per day – and the actual number of the stolen bike might be higher (CBS, 2015; Scully, 2016). In fact, when more bikes are stolen, there is a greater chance that people might unwittingly end up buying stolen bikes and this results in a vicious cycle.

One effort that has been made to tackle the bike theft issue is the *BikeID Project* proposed by a Pre-Master student Jaimil Patel in the *UT Entrepreneurial Challenge* at the University of Twente (UT) in Enschede (2018). The idea is to create an anti-theft device together with a mobile application that can provide a bike with a transferable identification and a tracking system to locate the bike when needed. This innovative idea applies the *Internet of Things (IoTs)* technology by connecting a bike and a user via a mobile application that receives data from a chip of the device that is attached to the bike, enabling users to have more control over their bikes. This anti-theft device is not an update of a traditional bike security tool such as a bike lock or a chain (Patel, 2018). It is a radical innovation that departs from existing practices and represents revolutionary yet risky changes in technology (Dewar & Dutton, 1986; Ettlie et al., 1984; Lüders et al., 2017). While various factors are affecting the acceptance of this tech-product, this study focuses on the persuasiveness of the introductory product ads among potential users.

When investigating the acceptance of a certain idea or product, marketing communication traditionally centralises around influencing beliefs, attitudes and behaviours of the target audience, yet in recent years, more emphasis had been given to the cognitive experiences of the audiences while processing the ads (Graf et al., 2018; Aydin, 2018). In this case study, when introducing the anti-theft devices for bikes in the Netherlands, the potential consumers identified are both Dutch citizens and local expats from different cultural groups who use bicycles on a daily basis. According to previous scholars, western and eastern consumers differ from each other when it comes to dominant regulatory focus (Lockwood et al., 2005; Uskul et al., 2009; Kurman & Hui, 2011) and cognitive navigation styles (Nisbett, & Norenzayan, 2002; Yu & Roh, 2002; Cyr & Trevor-Smith, 2004). These differences might lead to different subjective perceptions of content design elements, such as message framing and layout design. Nevertheless, most of these studies chose North Americans to represent the "western" culture, while in this study, Western Europeans have been investigated, on account that they are the main target audience of the product used in this case study. To be more precise, "Western Europe" refers to United Kingdom, Ireland, the Netherlands, Belgium, Luxemburg, France, Monaco, Germany, Austria,

Switzerland, Liechtenstein, based on an incorporated definition of United Nations and Central Intelligence Agency of the United States of America. Speaking of eastern consumers, individuals with Chinese cultural background are the target group of this study, including individuals from Mainland China, Hong Kong SAR - China, and Taiwan region, whose mother tongue are either Mandarin or Cantonese. Therefore, the present study sheds light on the acceptance of innovative technology, by investigating how the product introduction, varied in content design elements, is affected by dominant regulatory focus and cognitive navigation styles between two distinct cultural groups – Chinese and Western European.

***RQ**: When introducing an innovative tech product, to what extent do message framing and layout design influence the persuasiveness of product introduction among Chinese and Western European?*

Following a deductive approach, this study is among the first demonstrations of manipulating both textual and visual design elements when it comes to the ads on an innovative tech product. While previous studies analysed participants from English-speaking countries such as the United States of America, United Kingdom, and Australia to represent the western culture, this study includes Western Europeans to the profile of the western society.

# 2 Theoretical Framework

## 2.1 Cultural Differences In Technology Acceptance

Innovative products or services represent new offerings that intend to serve the needs of customers better, and promise enhanced value for them (Kristensson et al., 2017). Although radical innovations are often advocated as providing greater consumer benefits as compared to incremental innovations, consumers usually face more uncertainty and resistance towards radical innovations (Thorbjørnsen, 2017). Because it is difficult for consumers to estimate the extent that the innovative product or service will be useful to them, and figure out how they should change their behaviours in order to receive potential benefits (Alexander et al., 2008; Hoeffler, 2003).

As a foundation for researching innovation acceptance and adoption, Rogers (1995) proposed that the theory of 'diffusion of innovation', dividing individuals into different categories in terms of accepting or resisting novelty technologies. However, while individuals' own experience influence their positions in the diffusion of innovation, Hofstede (1980) argued that the degree of uncertainty avoidance is varied at a cultural level in his *Cultural Dimension Theory*. Uncertainty avoidance, as one of the six cultural dimensions, refers to a society's tolerance for risk and ambiguity versus the desire for predictability (Hofstede, 1980). According to Hofstede, most of the Western European countries [Belgium (94), France (86), Germany (65), the Netherlands (53)] score higher in uncertainty avoidance compared to individuals from the Greater China region [China (30), Hong Kong-China (29) and Taiwan region (69)]. Based on Hofstede-Insights, Chinese are adaptable, entrepreneurial and are relatively comfortable with ambiguity. Therefore, when introduced to an innovative technological product, it is hypothesised that Chinese generally have a higher acceptance compared to Western Europeans.

While accepting a technology is a long-term process, this study focuses on the propensity to have the switching attitudes based on their perception of the product ads. More explicitly, ad message involvement, perceived information value and willingness to try are three indicators of the propensity to accept the product in this study.

*Ad Message Involvement* refers to the extent to which a person reports spending effort processing the particular advertisement he/she was exposed to and that it helped him/her to imagine using the product (Smith, et al., 2008). According to Wang (2006), ad message involvement is an important metric to measure advertising effectiveness.

*Perceived Information Value* refers to the degree to which a person considers that online information provides a reasonable amount of useful information (Holzwarth et al., 2006). Originally *Information Value* refers to "an interactive relativistic preference experience of information which in essence

involves a process of comparative valuation of information" (Holbrook, 1994, p. 22). With the emergence of the website, information value is manifested to the quality information by satisfying the user's information needs (Xiang et al., 2009; Cho & Sung, 2012).

*Willingness to try* refers to the degree to which a person expresses openness to use information learned from advertising when making try-out decisions (Soh et al., 2009).

Hence, the following hypotheses are formulated:

***H1**: When introducing an innovative technological product, Chinese users score higher than users from Western Europe in **Ad message involvement**;*
***H2**: When introducing an innovative technological product, Chinese users score higher than users from Western Europe in **Perceived Informative value**;*
***H3**: When introducing an innovative technological product, Chinese users score higher than users from Western Europe in **Willingness to try***

## 2.2 Message Framing

Widely-used as a technique to affect the behavioural decisions of the message recipients, framing refers to the manipulation of the "decision-makers conception of the acts, outcomes, and contingencies associated with a particular choice" according to Tversky and Kahneman (1982, p. 453). Mirsch et al. (2017) further elaborated on framing by describing it as a decision problem that is controlled in terms of accentuation, orientation and presentation in different methods. This research focuses on the orientation dimension of the framing technique, at which messages are categorised into two "orientations", i.e. maximising gains or minimising losses.

### 2.2.1 Gain- vs Loss-Framed Messages

According to Tversky & Kahneman, gain or loss framing refers to phrasing a statement that describes a choice or outcome concerning its positive (gain) or negative (loss) features, while keeping the original meaning unaltered (1981). More precisely, scholars distinguished between two ways of manipulating message frames: one being whether benefits deriving from a goal may or may not be attained; while the others being whether negative end states may or may not be avoided (Rothman & Salovey, 1997).

Previous studies on gain/loss message framing effects focused health-related, environmental-related or leisure-related messages or the advertisements of health-related products (Rothman & Salovey, 1997, Uskul et al., 2009; Arora, 2007; Hsu & Chen, 2014; Xue, 2015; Zhang et al., 2018). For instance, when investigating ad message involvement in tourist destination image formation, Zhang et al. (2018) argued that consumers under gain-framed message condition tend to have higher destination image perceptions compared to those under loss-framed message conditions.

Until the recent decade, scholars explored the role of message framing on the acceptance of innovative technologies (Balbo & Jeannot, 2015; Kurila et al., 2016; Moon et al., 2016). Nevertheless, whether the gain-framed messages or the loss-framed messages exert more effective communication is still debated. When studying message framing and acceptance of branchless banking technology, Kurila et al. (2016) argued that message framing manipulations do not directly influence self-reported scores on technology acceptance variables. Moon et al. (2016) suggested that for innovative sustainable products, negative message framing facilitates better adoption compared to positive message framing. Moon et al. also mentioned that a hybrid (combination of positive and negative) message framing is more effective for those consumers with a positive attitude toward such adoption. Additionally, based on the experiments of Balbo & Jeannot (2015), the effect of message framing is associated with short-term or long-term purchase. More precisely, when promoting an innovative product, a gain-framed claim is associated with a long-term purchase, and a loss-framed claim is associated with a short-term purchase are the most effective combinations (Balbo & Jeannot, 2015). Considering the innovative anti-theft device for bikes is an innovative, sustainable product that requires a long-term possession, it is hypothesised that gain-messages score higher in user's propensity to accept.

***H4**: When introducing an innovative technological product, gain-framed messages score higher as opposed to loss-framed messages in **Ad Message Involvement***
***H5**: When introducing an innovative technological product, gain-framed messages score higher as opposed to loss-framed messages in **Perceived Information Value***
***H6**: When introducing an innovative technological product, gain-framed messages score higher as opposed to loss-framed messages in **Willingness to Try***

### 2.2.2 Promotion- vs. Prevention- Regulatory Focus

Apart from the factor of message framing, the self-regulatory system of the message recipient has drawn great interest in the research community as it plays an essential role in driving evaluations (Higgins, 1997, 1998, 2002), preferences (Higgins, 2005, 2006) and behaviours (Higgins, 2000). According to Higgins' *Regulatory Focus Theory* (RFT), there are two separate and independent self-regulatory focus types, prevention-focus and promotion-focus (1997). Originally, RFT examines the relationship between the motivation of a person and the way in which they go about achieving their goals. Messages that emphasise on growth and advancement are supposed to appeal to a promotion-focus individual, whereas messages that emphasise on safety and security are likely to appeal to a prevention-focus individual (Higgins, 2000, 2005). Based on that, Higgins developed the *Regulatory Fit Theory* (Higgins, 2000, 2005), suggesting that there is a match between the regulatory focus and the type of task or framing situation. Cesario et al. (2004) also argued that when a message recipient "feels right" with the regulatory fit, this subjective experience transfers to the persuasion context and serves as information for relevant evaluations, including perceived message

persuasiveness together with opinions of the topic. Lee and Aaker (2004) further formulated two types of persuasive appeal embedded in regulatory concerns. While a promotion-focus appeal emphasises on aspirations towards ideals, the prevention-focus appeal is associated with the fulfilment of obligations, which is, to some extent, consistent with the conceptualisation of gains and losses (Lee & Aaker, 2004). In addition to that, scholars have proved that the regulatory fit could lead to expected behaviours. Hsu & Chen (2014) suggested that the occurrence of a regulatory fit leads to a more positive attitude and a greater intention to purchase organic food than when no regulatory fit occurs. Kobbeltvedt (2017) argued that regulatory fit resulted in more positive judgements in fitting versus non-fitting tasks.

### 2.2.3 Dominant Regulatory Focus across Cultures

Self-regulatory foci not only differ at the individual level, but it also varies on the cultural scale (Lockwood et al., 2005; Uskul et al., 2009; Kurman & Hui, 2011). The current literature on the relationship between regulatory foci and culture differences are mainly based on the *Cultural Dimension Theory* introduced by Hofstede (1980). Out of the six cultural dimensions, individualism-collectivism has been studied the most in association with regulatory foci. The cross-cultural comparison study conducted by Ouschan et al. (2007) showed that Australians, seen as individualists, were more promotion- but less prevention-focused than Japanese students, seen as collectivists. The study of Lockwood et al. (2005) indicated that Asian Canadian participants reported finding negative models which highlight strategies of avoiding failure more motivating than did European Canadians. This result also supported the correlation between the type of dominant regulatory focus and the attribute of a culture, in terms of individualism-collectivism.

Furthermore, more empirical studies have studied the congruency between regulatory foci, message framing and individuals' cultural backgrounds. The experiment conducted by Uskul et al. (2009) reveals that when responding to health messages, white British participants, who have a stronger promotion focus, are more persuaded by the gain-framed message, while East-Asian participants, who have a stronger prevention focus, are more persuaded by the loss-framed message. Xue's study (2015) indicated that negative message frames in green advertising generate a higher level of trust to towards green messages among Chinese consumers. Another study from Kung et al. (2016) suggested that regulatory fit can be a universal strategy for increasing motivation across the East and the West when it comes to the responses towards negative feedback. However, few studies focused on the strength between gain- and loss-framed messages on Chinese and Westerners when it comes to nudging users into an innovative product.

### 2.2.4 The Impact of Regulatory Fit on Acceptance

Cross-cultural studies argued that *Regulatory Fit* provides a neural base to the conceptual processing efforts (Lee & Aaker, 2004; Ho & Chuang, 2012). Being consistent with the predictions of Higgins' regulatory fit theory, the results from Lee & Aaker and Ho & Chuang indicated that when having a compatibility conditions fit, the ideas conveyed in the message are conceptually fluent. Likewise, Lee and Aaker (2004) found that when message recipients experience a match between message frame and regulatory focus of the content of the message, i.e. gain-framed message in a promotion-focus appeal, or loss-framed message in a prevention-focus appeal, their processing efforts are low due to an enhanced level of message comprehension. More precisely, message comprehension indicated the degree to which an individual who has been exposed to an advertisement deems that the claims made in the ads are simple to understand (MacInnis & Jaworski, 1989; Smith et al., 2008). In this study, it is hypothesised that message framing has an interaction effect with cultural groups on message comprehension when introducing an innovative product.

***H7**: When introducing an innovative technological product, message framing has an interaction effect with cultural groups on **Message Comprehension***
***a)** Message Comprehension is higher when the gain-framed message is presented to Western Europeans as opposed to Chinese.*
***b)** Message Comprehension is higher when the loss-framed message is presented to Chinese as opposed to Western European.*

Moreover, regulatory fit could bring about an increase in the persuasiveness of the information which led to a more favourable attitude towards the advertised product (Ho & Chuang, 2012). In a study focusing on individuals from Chinese culture, Ho & Chuang suggested that when Feng Shui appeal (the advice on creating harmonious surroundings) is compatible with the self-regulatory focus, individuals demonstrate a greater feeling of appropriateness. And that the fit between Feng Shui's suggestions and consumers' regulatory focus impacted decision making (2012). Scholars further argued that people tend to remain involved in an information source when the information is preferable and valuable at the level of their desired state (Hoffman & Novak, 1996; Cho & Sung, 2012). Thus, it is hypothesized that when message framing type fits the dominant regulatory focus of an individual, people's perceived information value, ad message involvement and behavioural intention is higher.

***H8**: When introducing an innovative technological product, message framing has an interaction effect with cultural groups on **Ad Message Involvement***
***a)** Ad Message Involvement is higher when the gain-framed message is presented to Western Europeans as opposed to Chinese.*
***b)** Ad Message Involvement is higher when the loss-framed message is presented to Chinese as opposed to Western European.*

***H9**: When introducing an innovative technological product, message framing has an interaction effect with cultural groups on **Perceived Information Value***
***a)** perceived Information Value is higher when the gain-framed message is presented to Western Europeans as opposed to Chinese.*
***b)** perceived Information Value is higher when the loss-framed message is presented to Chinese as opposed to Western European.*

***H10**: When introducing an innovative technological product, message framing has an interaction effect with cultural groups on **Willingness To Try***
***a)** Willingness To Try is higher when the gain-framed message is presented to Western Europeans as opposed to Chinese.*
***b)** Willingness To Try is higher when the loss-framed message is presented to Chinese as opposed to Western European.*

## 2.3 Layout Design

### 2.3.1 Cultural Cognitive Styles: Between The East and The West

Scholars found that people's cognitive characteristics are associated with their cultural backgrounds. For example, the cultural dimension "uncertainty avoidance" from Hofstede (1980) is found correlated with users' cultural cognitive styles. More precisely, Alexander et al. (2017) found that users from low-uncertainty avoidance countries, who are tolerant of risk and uncertainty, are likely to prefer less control in navigation. Nevertheless, users from high-uncertainty avoidance countries, where anxiety arises when uncertain situations are encountered, seek a formal navigation structure with more control to prevent them from getting lost. Another two cultural dimensions, namely context (high-context vs low-context) and time perception (monochronic vs polychronic) raised by Hall and Hall's (1990) are also found associated with users' cultural cognitive styles. Calabrese et al. (2012) indicated that users from low-context cultures prefer navigation structures that are simple and characterised by quick navigation since they rely more on the literal meaning of written and spoken communication rather than on the contextual cues (Hall & Hall, 1990). Kralisch et al. (2005) found that users from monochromic cultures, often with a single task focus, prefer linear and hierarchical structures, whereas users from polychromic cultures prefer parallel structures as they used to multi-tasking (Alexander et al., 2017).

Despite the general findings derived from different cultural dimensional theories, studies in specific countries or regions also supported the processing fluency between cultures and cognitive styles. In an early study by Abel and Hsu (1949), the way of processing information was found different between European Americans and Chinese Americans, with the use of Rorschach cards. While Chinese American participants were more likely to give so-called "whole-card" responses in which included all aspects of the card, their European American counterparts were more likely to give "part" responses, in which only a single aspect of the card was the basis of the response (Abel & Hsu, 1949). Kitayama et al. (2003)

conducted a framed-line test proved that the Japanese are more capable of incorporating contextual information in making a judgment on a focal object, whereas North Americans are more capable of ignoring contextual information. Moreover, it is found that East Asians tend to allocate their attention to both salient foreground objects and background information, whereas North Americans mainly focus on salient foreground objects (Masuda & Nisbett, 2001; Li et al., 2015).

These differences are found to root in different cognitive styles. Cognitive style, defined by Riding and Cheema (1991), is a compiled computer-presented test that measures individuals' position on two orthogonal dimensions – Wholist-Analytic (W-A) and Verbal-Imagery (V-I). The W-A dimension refers to an individual's preferred approach to organising and processing information. Individuals described as *Analytics* tend to deconstruct information into its components, whereas individuals described as *Wholists* tend to retain a global or overall view of information and they see clear interrelationships among topics in the discovery process (Riding & Cheema, 1991). Based on the distinction of cognitive styles, Nisbett & Norenzayan (2002) further developed the *Cultural Cognition Theory*, which argued that Eastern Asian and Western people process information differently in terms of attention to the field –while Eastern Asian tend to have a "holistic" cognitive style, Westerners are more inclined to "analytic" cognitive style (Nisbett & Norenzayan, 2002; Nisbett, et al., 2001). Researchers suggested that a layout that fits the cognitive style of users provides a communication "bridge" between the user and the system, and accordingly, webpage designs should be carried out according to the target audience's specific cognitive style, in order to enhance perception and usage of a webpage (Yu & Roh, 2002; Cyr & Trevor-Smith, 2004; Dong & Lee, 2008).

### 2.3.2 Web Layout Design: Analytic-Oriented vs Holistic-Oriented

Furthermore, empirical studies investigated the impact of cultural cognitive styles on web layout design. Developed on Nisbett & Norenzayan's *Cultural Cognitive Theory* (2002), Dong & Lee conducted an eye-tracking usability test (2008). Their results supported that cognitive differences exist among holistically-minded people and analytically-minded people. They further translated the insights into the guidelines for web layout design, which are similar to the four dimensions Faiola and MacDorman (2008) proposed for categorising holistic-oriented and analytic-oriented layout design. According to the researchers (Dong & Lee, 2008; Faiola & MacDorman, 2008), holistic cognitive styles and analytic cognitive styles could lead to different ways of designing and organizing information for the Web, such as 1. the range of choices on the website; 2. the relationship between the web content and the context; 3. the presentation of the site's hierarchy; 4. the overall logic of placing information, which function guidelines as online information representation (Nisbett & Norenzayan, 2002; Dong & Lee; 2008; Faiola & MacDorman, 2008). This guideline could provide design web visitors with a contextual and structural model for understanding and accessing information. A more precise elaboration on the differences

between holistic- and analytic-oriented in web design is presented in *Table 1* in the *Methodology* Chapter.

### 2.3.3 The Impact of Perceptual Fluency on Acceptance

Since the digital world has no physical boundaries, there have been suggestions that online navigation design should be adapted for regional or local consumption, because people from different cultures have different cognitive styles (Yu & Roh, 2002; Cyr & Trevor-Smith, 2004; Alexander et al., 2017). Various studies investigated the similarities and differences in cultural preferences for various web interface elements such as layout, navigation, links, multimedia, visual, representation, colours, and text between different cultural groups (Faiola & Macdorman, 2008; Alexander et al., 2017). Janiszewski (1990) argued that the fit between people's visual perception and the navigation scheme would result in a perceptual fluency. More precisely, perceptual fluency is the ease of identifying certain visual stimuli, such as figure-ground contrast, visual clarity and print fonts (Reber et al., 2004; Petrova & Cialdini 2005; Graf et al. 2018). Human-Computer Interaction (HCI) researchers proved that when there was a match between cognitive styles and cultural groups, the adapted web design received higher scored in the usability test (Masuda & Nisbett, 2001; Choi et al., 2004; Chu & Spires, 2008; Li et al., 2015). More precisely, American and Chinese individuals performed information-seeking tasks faster when using web content created by designers from their own culture of origin (Faiola & Matei, 2005). In an in-lab exploratory study, Faiola and MacDorman (2008) further expanded the scope of usability test by examining the visual satisfaction. Their study showed that American, Russian and Chinese participants would prefer the websites designed by those of their own national culture when being exposed to websites with various design elements, including layout design and navigation system. Consequently, Alexander et al. (2017) developed the term "Cultural Usability", which is measured by subjective users perceptions or preferences over different website layout designs.

In the current research, however, the manipulated web design was limited to a rather simple layout design of a piece of infographics. For the infographics, *Navigation Convenience* and *Aesthetic Appeal* of the infographics will be measured in different cultural groups. *Navigation Convenience*, seen as one of the essential visual elements of web content, layout design/ information navigation systems plays an essential role in influencing customers' online experience and corresponsive online decision-making behaviours (Mašínová & Švandová, 2014; Alexander et al., 2017). *Aesthetic Appeal* refers to the extent that a person likes a website because of the way it looks (Kwon & Lennon, 2009). Furthermore, aesthetic pleasure is grounded in the perceiver's processing dynamics - the more fluently perceivers can process stimuli, the more positive their aesthetic response (Reber et al., 2004). Hence, the following hypotheses have been formulated:

***H11**: When introducing an innovative technological product, layout design has an interaction effect with cultural groups on perceived **Navigation Convenience***
***a)** perceived Navigation Convenience is higher when the analytic layout is presented to Western Europeans as opposed to Chinese.*
***b)** perceived Navigation Convenience is higher when the holistic layout is presented to Chinese as opposed to Western European.*

***H12**: When introducing an innovative technological product, layout design has an interaction effect with cultural groups on **Aesthetic Appeal of the Ads***
***a)** Aesthetic Appeal is higher when the analytic layout is presented to Western Europeans as opposed to Chinese*
***b)** Aesthetic Appeal is higher when the holistic layout is presented to Chinese as opposed to Western European.*

Moreover, scholars argued that high perceptual fluency leads to higher behavioural intention (Im et al., 2010). When investigating pleasurable online shopping experience, Im et al. found that the perceptual fluency played a significant role in exerting online purchase intention (2010). Hence, this study hypothesizes the layout design will have an interaction effect with cultural groups on willingness to try, based on a perceptual fit between design elements and people's navigation schemes cultivated in their own cultural background.

***H13**: When introducing an innovative technological product, layout design has an interaction effect with cultural groups on **Willingness To Try***
***a)** Willingness To Try is higher when the analytic layout is presented to Western European as opposed to Chinese.*
***b)** Willingness To Try is higher when the holistic layout is presented to Chinese as opposed to Western European.*

## 2.4 Original Research Model

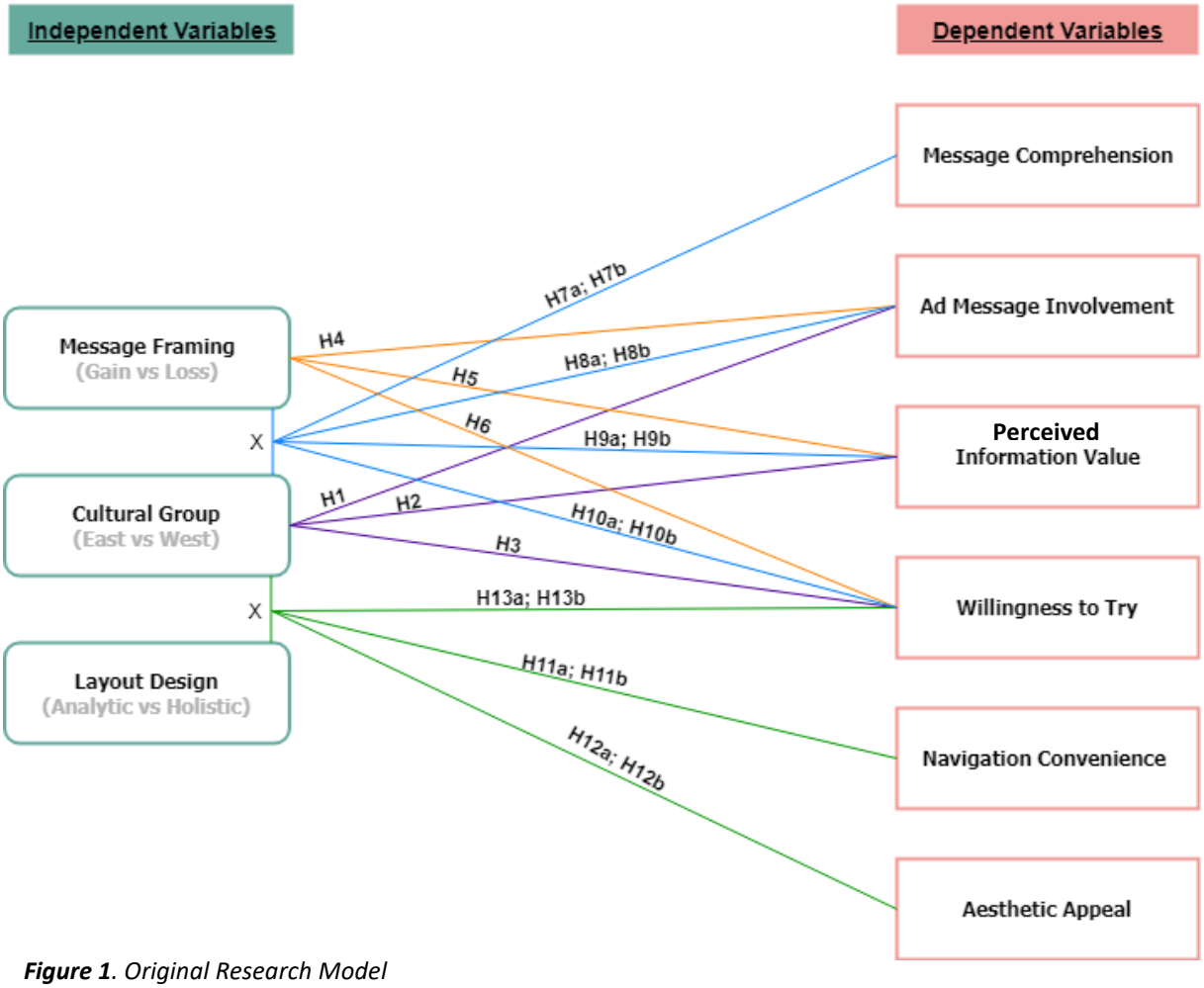



***Figure 1***. *Original Research Model*

# 3 Methodology

## 3.1 Research Design

A 2x2x2 between-subject experiment is designed to investigate the influence of message framing types (gain-framed vs loss-framed), layout design styles (holistic vs analytic), and cultural backgrounds (Western European vs Chinese) on consumers' responses towards the introductory ad of the anti-theft device for bicycles. Accordingly, four types of stimuli, i.e. 1. gain-framed messages with analytic layout; 2. loss-framed messages with analytic layout; 3. gain-framed messages with holistic layout; 4. loss-framed messages with holistic layout, were presented to two cultural groups, which led to eight experimental conditions in total.

## 3.2 Stimulus Material

The stimulus material was designed in the form of a piece of infographics, with variations in message framing and layout design. As discussed previously, the gain-framed and loss-framed messages mainly differ in the emphasis of the end states of an intervention. The gain-framed messages emphasise the positive outcomes deriving from a goal may or may not be attained; while the loss-framed messages focus on whether negative outcomes may or may not be avoided (Rothman & Salovey, 1997, Uskul et al., 2009; Arora, 2007; Hsu & Chen, 2014). The textual part of the infographics is presented below.

*Gain Version*

***Have certified ownership of your bike***

*With the digital certificate provided with the device, your bike is registered under your name.*

***Get additional assurance***

*With the digital ownership, you are eligible to claim for a liability insurance coverage in case of bike damage.*

***Save Time***

*Using the app, you can find your bike in the parking area in 2 seconds.*

***Your lost bike is trackable***

*In the unfortunate event that your bike gets stolen, you can track it using the mobile app since the bike is geo-tagged.*

***Entitled to legal assistance***

*By presenting the digital certificate in the app to the police, you can get legal assistance on claiming your stolen bike back.*

***Save Money***

*By claiming the stolen bike back, you save money you would have spent on another bike.*

*Loss Version*

***Why risk not having certified ownership?***

*Without the digital certificate provided with the device, your bike is not registered under your name.*

***Why risk not having coverage for bike damage?***

*Without the digital ownership, you are not eligible to claim for a liability insurance coverage in case of bike damage.*

***Why waste time looking for your bike?***

*Without the device and the app, you will probably waste much time looking for your bike in the parking area.*

***Why risk losing track of your lost bike?***

*In the unfortunate event that your bike gets stolen, you will lose track of it if it is not geo-tagged.*

***Why risk not getting your stolen bike back?***

*Even if you accidentally found your stolen bike, you will not be able to receive legal assistance on getting it back without ownership proof.*

***Why risk spending more money on bikes?***

*If you fail to get your stolen bike back, you need to spend money buying another bike.*

In the infographics, the body of the text communicates "what's in it for the consumers" in six aspects, functioning as the "ads" of the product (a device on the bike, an app in the smartphone). The "gain-framed" or "loss-framed" messages are mainly manipulated in titles and descriptions of the product. The following statements are developed to investigate whether participants can distinct between gain- and loss-framed messages, based on previous studies (Lee & Asker, 2004):

*1. The emphasis of these messages is on benefits you may have from using the product.*
*2. The emphasis of these messages is on troubles you might have from not using the product.*
*3. I can directly perceive positive consequences when using the product.*
*4. I can directly perceive negative consequences when not using the product.*

Regarding the visual part of the infographics, the layout design is manipulated. Due to limited investigations in layout design in infographics when cultural factors have been considered, this study referred to previous studies in website navigation design to some extent, when defining "analytic design" and "holistic design", (Nisbett & Norenzayan, 2002; Dong & Lee; 2008; Faiola & MacDorman, 2008). Detailed elaborations in differences between holistic- and analytic-oriented in web design can be seen in *Table 1*.

***Table 1.*** *Differences between holistic- and analytic-oriented in web design*

| Differences in Web design | Holistic-oriented | Analytic-oriented |
|---|---|---|
| The range of choices on the website | Interface design and information architecture provide a broader range of choices for viewing the Web site. | Interface design and information architecture typically lack a range of choices for viewing the content. |
| The relationship between the web content and the context | Content is designed in the context of the whole while attempting to interconnect the various parts, i.e., everything is relative and can usually be understood in relation to the context. | Content is structured and divided into distinct but clearly interrelated components so users can focus on each one independently. |
| The presentation of the site's hierarchy | The information architecture may be represented by a sitemap that clearly visualizes the site's hierarchy. The look and feel of the site might be considered inseparable from its content | The appearance of the site might contain separate units or objects that are valued because of their independent importance. |
| The overall logic of placing information | The overall information design is intuitive. With a thematic approach to the design of information, i.e., based on the thematic relations among groups. | Information design appears more logical with an approach that is more functional based on inferences drawn from the items in the groups. |

In the actual design, the "analytic-oriented" or "holistic-oriented" layout are mainly manipulated in two aspects. Firstly, the relationship between the content and the context is manipulated. For the holistic-oriented version, messages are designed in the context of the whole while attempting to interconnect various parts. More precisely, this interconnection is illustrated by connecting each feature in a circle without a clear starting point to look at. For analytic-oriented version, messages are structured into distinct but clearly interrelated components. The features are presented on a line with a relatively clear start point (from top left, next to the product image). Secondly, the presentation of

the information hierarchy is manipulated in the infographics. In website layout design, the information architecture is normally represented by a sitemap that visualises the site's hierarchy. When it comes to the static infographics, information hierarchy is designed with the use of colour. For the analytic version, the title of each feature and its correspondent descriptions are put in one colour block, in an attempt to let participants focus on each one independently. For the holistic version, the title and the description are separate, with all the titles in colour A and all descriptions in colour B. Other visual parts of the infographics, including images of a bike and the device and icons of each feature, remain the same.

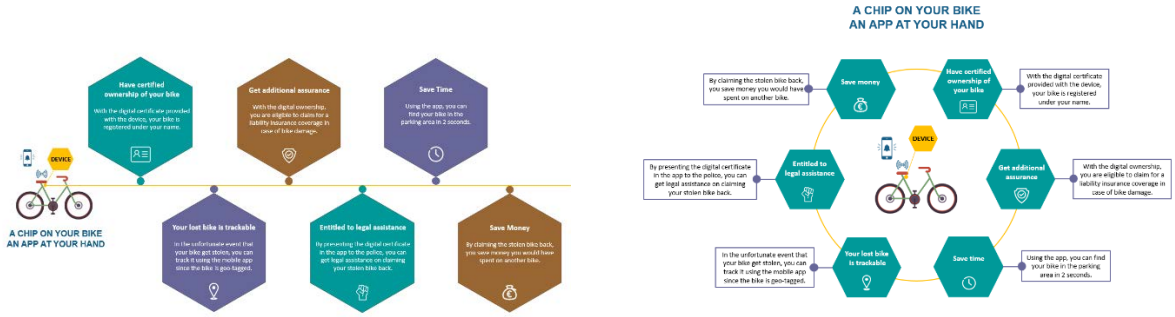



***Figure 2.*** *Layout Design* ***Left****: Analytic Style;* ***Right****: Holistic Style*

The following statements are developed to investigate whether participants can distinguish between analytic- and holistic- oriented layout:

*1. The features are arranged in a linear (sequential) way.*
*2. The features are arranged in an integral (interconnected) way.*
*3. When I first look at the layout, my attention is immediately drawn to a specific feature of the product.*
*4. When I first look at the layout, my attention is immediately drawn to the six features as a whole.*

## 3.3 Pre-Test

A manipulation check was conducted to estimate if subjects perceive the stimulus materials as it is anticipated. In total, 21 people were recruited from two cultural groups (Western European, N=10; Chinese, N=11). Considering the feasibility of the study, the manipulation check was designed as a within-subject test, as each participant could see all experimental conditions. After seeing each condition, their opinions on the statements were collected and presented in *Table 2* and *Table 3*.

*Homogeneity Between Conditions*

According to the Paired Sample T-Test, the difference between gain- and loss- framing conditions in all four statements was statistically significant ($p<0.01$).

***Table 2*** *Paired Sample T-Test on statements of Message Framing*

| Statement | Version | Mean | SD | t-Value | p-Value |
|---|---|---|---|---|---|
| The emphasis of these messages is on benefits you may have from using the product. | Gain | 4,62 | 0,50 | t(20)=6.04 | **.00** |
| | Loss | 2,62 | 1,32 | | |
| The emphasis of these messages is on troubles you might have from not using the product. | Gain | 2,33 | 1,20 | t(20)=-7.20 | **.00** |
| | Loss | 4,62 | 0,67 | | |
| I can directly perceive positive consequences when using the product. | Gain | 4,48 | 0,51 | t(20)=5.83 | **.00** |
| | Loss | 2,76 | 1,34 | | |
| I can directly perceive negative consequences when not using the product. | Gain | 2,38 | 1,02 | t(20)=-7.03 | **.00** |
| | Loss | 4,38 | 0,92 | | |

*Note: The statements were measured on a 5-point Likert scale (1=Disagree/5=Agree)*

For analytic/holistic layout conditions, the differences were shown to be significant (p≤0.01) based on the first sets of "the features are arranged in a linear (sequential)/integral (interconnected) way".

***Table 3*** *Paired Sample T-Test on statements of Layout Design*

| Statement | Version | Mean | SD | t-Value | p-Value |
|---|---|---|---|---|---|
| The features are arranged in a linear (sequential) way. | Analytic | 4,33 | 0,58 | t(20)=8.65 | **.00** |
| | Holistic | 1,90 | 1,04 | | |
| The features are arranged in an integral (interconnected) way. | Analytic | 3,14 | 1,06 | t(20)=-4.14 | **.00** |
| | Holistic | 4,19 | 0,68 | | |
| When I first look at the layout, my attention is immediately drawn to a specific feature of the product. | Analytic | 3,29 | 1,01 | t(20)=0.83 | **.42** |
| | Holistic | 3,00 | 1,10 | | |
| When I first look at the layout, my attention is immediately drawn to the six features as a whole. | Analytic | 3,24 | 1,26 | t(20)=-2.90 | **.01** |
| | Holistic | 4,24 | 1,04 | | |

*Note: The statements were measured on a 5-point Likert scale (1=Disagree/5=Agree)*

However, in the statement "when I first look at the layout, my attention is immediately drawn to a specific feature of the product", the differences between the two versions of layout were not significant (p=0.42). Nonetheless, this set of statements carries the possibilities of having recall bias; therefore, if the result is still not significant when being tested in the main test, it will be excluded from the manipulation.

## 3.4 Procedure

In the main test, the participants were requested to complete an online survey via their desktops or laptops. The questionnaire started with an introduction which communicated the goals of the research. Next, participants were asked if they agree to participate in the survey. Should they disagree, the survey would end; should they agreed to continue, they would be given a piece of text containing the basic information about the anti-theft device for bicycles. Following that, they were asked to confirm that they had read the text before proceeding to the body of the survey.

The body of the survey consisted of three parts. First, the basic concept of the an-theft device for bikes was introduced to the participants. The participants needed to confirm that they had read the basic concept before continuing. Second, participants were randomised to one out of four versions of infographics. After viewing the content in the infographics, participants were exposed to a series of five-point Likert scales questions that measured both on dependent variables and the stimulus materials. They were able to see the same type of infographics while answering questions. The survey ended with a few demographics questions covering gender, age, education level, academic background, nationality, years stayed in the Netherlands and previous experience of losing their bikes.

## 3.5 Participants

In total, 238 valid responses have been collected (see *Table 4 on p.23*), with 100 male, 137 female and 1 participant who declared to be in "other gender". The age of the participants ranges from 17 to 55, with an average of 24 (SD=4.83). In terms of their education level, nearly half of the respondents hold or currently pursuing a Bachelor's degree, around 38% hold or currently pursuing a Master's degree and around 12% are PhD students or have obtained a Doctoral degree. In terms of academic background, participants with Social Sciences (including Business Studies) background take up to 49.2%, 38% were in the field of STEM (Science, Technology, Engineering, Mathematics), 8% are in the area of Arts, Design and Humanities, and 4.6% indicated that they are from other domains. Speaking of geographic demographics, 117 respondents are from the Greater China region, while 121 are from Western European countries. About one-fourth of them have lived in the Netherlands for most or whole of their life; around 29 % of the participants lived in the Netherlands for less than two years, 22 % of them have lived between two and five years, and 8.8% have lived more than five years. Among the rest 14.3% of the participants who indicated that they have never lived in the Netherlands, there are quite a few German participants who live in the bordering German cities of Enschede while having their student life in the Netherlands. In addition, over 40% of all the participants declared that they had once lost their bikes.

Furthermore, some statistical tests have been done on the six demographic factors. Regarding the continuous demographic factor *Age,* there was no significant difference between groups as determined by one-way ANOVA, $F(22, 215) = 1.09$, $p = 0.36$. A Chi-square test was conducted to check upon five categorical demographic factors, to see if there were any differences in proportions between eight experimental groups. The results showed that, the difference in proportions of eight experiment conditions was significant over three factors, *Major area of study* [$\chi^2(21) = 34.14$, $p = 0.04$], *Educational level* [$\chi^2(21) = 54.47$, $p < 0.01$], and *Years stayed in the Netherlands* [$\chi^2(28) = 123.09$, $p < 0.01$]. The significance in groups regarding "Years stayed in the Netherlands" was expected on account that the "West" groups had a higher chance than the "East" groups when it comes to the group "I have lived in

the Netherlands for most of my life/my whole life". Nevertheless, because many respondents might not live in the Netherlands for a long time yet in other Western countries that hold similar dominant regulatory focus types and cognitive styles as Dutch people, the possible influence of the variable *Years in the Netherlands* was not analysed. The difference in proportions of eight experiment conditions were not significant in the rest two factors *Gender* [$\chi^2(14) = 17.73$, $p = 0.22$] and *Experience of losing one's own bike* [$\chi^2(7) = 10.17$, $p = 0.18$].

***Table 4.*** *Demographic Information*

| Demographic Construct \ Experimental Condition | Gain Analytic East N= 31 | Gain Analytic West N= 31 | Gain Holistic East N= 26 | Gain Holistic West N= 34 | Loss Analytic East N= 29 | Loss Analytic West N= 31 | Loss Holistic East N= 31 | Loss Holistic West N=25 | Total N= 238 |
|---|---|---|---|---|---|---|---|---|---|
| **Gender, N (%)** | | | | | | | | | |
| Male | 13 (2,5%) | 11 (4,6%) | 10 (4,2%) | 11 (4,6%) | 19 (8,0%) | 11 (4,6%) | 16 (6,7%) | 9 (3,8%) | 100 (42,0%) |
| Female | 18 (7,6%) | 20 (8,4%) | 16 (6,7%) | 23 (9,7%) | 10 (4,2%) | 20 (8,4%) | 14 (5,9%) | 16 (6,7%) | 137 (57,6%) |
| Other | - | - | - | - | - | - | 1 (0,4%) | - | 1 (0,4%) |
| **Age, M (SD)** | | | | | | | | | |
| | 26,7 (5,33) | 24,9 (3,72) | 22,7 (3,67) | 25,6 (3,45) | 22,5 (3,89) | 24,5 (3,61) | 23,8 (8,03) | 24,1 (4,83) | 24,1 (4,83) |
| **Educational level, N (%)** | | | | | | | | | |
| Undergraduate / Bachelor's degree | 8 (3,4%) | 20 (8,4%) | 12 (5,0%) | 23 (9,7%) | 6 (2,5%) | 22 (9,3%) | 9 (3,8%) | 18 (7,6%) | 118 (49,6%) |
| Graduate / Master's degree | 17 (7,1%) | 10 (4,2%) | 9 (3,8%) | 11 (4,6%) | 16 (6,7%) | 7 (2,9%) | 17 (7,1%) | 4 (1,7%) | 91 (38,2%) |
| PhD / Doctoral degree | 6 (2,5%) | 1 (0,4%) | 5 (2,1%) | - | 7 (2,9%) | 2 (0,8%) | 5 (2,1%) | 3 (1,3%) | 29 (12,2%) |
| **Academic background, N (%)** | | | | | | | | | |
| Social Sciences (Including Business Studies) | 15 (6,3%) | 21 (8,8%) | 8 (3,4%) | 15 (6,3%) | 12 (5,0%) | 18 (7,6%) | 11 (4,6%) | 17 (7,1%) | 117 (49,2%) |
| STEM (Science, Technology, Engineering, Mathematics) | 11 (4,6%) | 6 (2,5%) | 15 (6,3%) | 14 (5,9%) | 12 (5,0%) | 10 (4,2%) | 19 (8,0%) | 4 (1,7%) | 91 (38,2%) |
| Arts, Design, Humanities | 2 (0,8%) | 2 (0,8%) | 3 (1,3%) | 4 (1,7%) | 2 (0,8%) | 2 (0,8%) | - | 4 (1,7%) | 19 (8,0%) |
| Others | 3 (1,3%) | 2 (0,8%) | - | 1 (0,4%) | 3 (1,3%) | 1 (0,4%) | 1 (0,4%) | - | 11 (4,6%) |
| **Years lived in the Netherlands, N (%)** | | | | | | | | | |
| I have never lived in the Netherlands. | 4 (1,7%) | 5 (2,1%) | 5 (2,1%) | 9 (3,8%) | - | 6 (2,5%) | 1 (0,4%) | 4 (1,7%) | 34 (14,3%) |
| Less than 2 years | 12 (5,0%) | 4 (1,7%) | 7 (2,9%) | 6 (2,5%) | 12 (5,0%) | 5 (2,1%) | 13 (5,5%) | 11 (4,6%) | 70 (29,4) |
| Between 2 and 5 years | 8 (3,4%) | 1 (0,4%) | 8 (3,4%) | 4 (1,7%) | 13 (5,5%) | 3 (1,3%) | 16 (6,7%) | - | 53 (22,3%) |
| More than 5 years | 4 (1,7%) | 1 (0,4%) | 6 (2,5%) | 1 (0,4%) | 4 (1,7%) | 2 (0,8%) | 1 (0,4%) | 2 (0,8%) | 21 (8,8%) |
| For most of my life / my whole life. | 3 (1,3%) | 20 (8,4%) | - | 14 (5,9%) | - | 15 (6,3%) | - | 8 (3,4%) | 60 (25,2%) |
| **Experience of having a bike stolen, N (%)** | | | | | | | | | |
| Yes | 11 (4,6%) | 16 (6,7%) | 5 (2,1%) | 13 (5,5%) | 11 (4,6%) | 15 (6,3%) | 13 (5,5%) | 14 (5,9%) | 98 (41,2%) |
| No | 20 (8,4%) | 15 (6.3%) | 21 (8,8%) | 21 (8.8%) | 18 (7,6%) | 16 (6,7%) | 18 (7,6%) | 11 (4,6%) | 140 (58,8%) |

## 3.6 Measures

Operationalisation of the six dependent variables has been retrieved from the *Marketing Scales Handbook* (Bruner II, 2012). More precisely, the present study referred to items of the constructs developed by previous researchers stated in the scale origin in *Table 5.* The Cronbach' alpha on each measured construct has been presented in the table as well. When utilising these items for the present research, a few details have been adapted to fit with the present research context. First, "ad" and "website" in the statement replaced by "infographics" to be more accurate. Second, the general term "product" used in previous items was replaced by "the bike device" to be more precise. Third, for the construct "perceived information value", the item "the information offered helps me reconsider the security of my bike" was added, in an attempt to give an explicit example of "information value" in this case. In the real experiment, all statements were measured by 5-point Likert scales (disagree –agree).

***Table 5.*** *Scales of the Measured Construct from Previous Literature*

| Construct | Cronbach's alpha | Items | Scale Origin |
|---|---|---|---|
| Message Comprehension | .76 | The claims made in the infographics were easy to understand.<br>I was able to comprehend the claims.<br>The claims were hard to understand. (r) | Smith, Chen, and Yang, (2008). |
| Navigation Convenience | .96<br>.99 | It is easy to find what you are looking for in this infographics.<br>It is easy to navigate around this infographics.<br>The infographics are well organized. | Kwon & Lennon (2009) |
| Perceived Information Value | .85 | The information offered is valuable.<br>The information offered is good.<br>The information offered is useful.<br>The information offered helps me reconsider the security of my bike. | Holzwarth, Janiszewski, and Neumann (2006). |
| Aesthetic Appeal | .88<br>.91 | I like the look and feel of this layout design.<br>I like the images used in this layout.<br>This layout design makes the concept of the bike device look very appealing. | Kwon and Lennon (2009) |
| Ad Message Involvement | .86 | I gave the information a lot of consideration.<br>I thought about my own experience with bike use when I looked at the information.<br>The information stimulated my imagination.<br>I was able to imagine using the bike device. | Smith, Chen, and Yang (2008). |
| Willingness to try | .89 | I am willing to consider the information conveyed in the infographics when making the decision to try the bike device.<br>I am willing to rely on the information conveyed in the infographics when making the decision to try the bike device.<br>I am willing to try the bike device based on the information conveyed in the infographics.<br>I am willing to recommend the bike device that I have seen in the infographics to friends of mine who are concerned about securing their bikes. | Soh, Reid, and King (2009) |

## 3.7 Reliability and Validity of the Constructs

A reliability test and a factor analysis had been conducted, with results presented in *Table 6* and *Table 7*, respectively. Based on the results, a construct in the original research model, *Ad Message Involvement*, has been excluded from the main test, due to a relatively low validity and reliability (a=0.53). Hence, the corresponsive hypotheses on *Ad Message Involvement* have been excluded as well. Moreover, the statements of *Navigation Convenience* and *Aesthetic Appeal* had been categorised under one construct, based on the Factor Analysis (*Table 7*). Hence, it is decided to include *Visual Satisfaction* as the merged construct in the main test, measured by items of *Navigation Convenience* and *Aesthetic Appeal*. Thus, the original hypotheses regarding *Navigation Convenience* and *Aesthetic Appeal had also been adapted into the ones that hypothesise on Visual Satisfaction*.

***Table 6**. Constructs: reliability scores, mean scores, standard deviations values and items*

| Construct | Cronbach's alpha | M (SD) | Items |
|---|---|---|---|
| Message Comprehension | 0,84 | 4.42 (2.36) | 1. The claims made in the infographics were easy to understand.<br>2. I was able to comprehend the claims.<br>3. The claims were hard to understand. |
| Visual Satisfaction | 0,86 | 3,94 (1,02) | 1. It is easy to find what you are looking for in this infographics.<br>2. It is easy to navigate around this infographics.<br>3. The infographics are well organized.<br>4. I like the look and feel of this layout design.<br>5. I like the images used in this layout.<br>6. This layout design makes the concept of the bike device look very appealing. |
| Perceived Information Value | 0,84 | 4.14 (0.86) | 1. The information offered is valuable.<br>2. The information offered is good.<br>3. The information offered is useful. |
| Ad Message Involvement | 0,53 | 3.84 (1.04) | 1. I thought about my own experience with bike use when I looked at the information.<br>2. The information stimulated my imagination. |
| Willingness to try | 0,82 | 3.77 (1.10) | 1. I am willing to consider the information conveyed in the infographics when making the decision to try the bike device.<br>2. I am willing to rely on the information conveyed in infographics when making the decision to try the bike device.<br>3. I am willing to try the bike device based on the information conveyed in the infographics.<br>4. I am willing to recommend the bike device that I have seen in the infographics to friends of mine who are concerned about securing their bikes.<br>5. The information offered helps me reconsider the security of my bike. |

***Table 7**: Rotated Component Matrix[a]*

| | Component | | | | |
|---|---|---|---|---|---|
| | **Visual Satisfaction** ***(NC + AA)*** | **Willingness to try out** | **Perceived Information Value** | **Message Comprehension** | **Ad Message Involvement** |
| **Visual Satisfaction** ***(Navigation Convenience + Aesthetic Appeal)*** | | | | | |
| I like the look and feel of this layout design. | 0,828 | | | | |
| This layout design makes the concept of the bike device look very appealing. | 0,695 | | | | |
| It is easy to navigate around this infographics. | 0,695 | | | | |
| The infographics are well organized. | 0,666 | | | | |
| I like the images used in this layout. | 0,632 | | | | |
| It is easy to find what you are looking for in this infographics. | 0,516 | | | | |
| **Willingness to try out** | | | | | |
| I am willing to try the bike device based on the information conveyed in the infographics. | | 0,748 | | | |
| I am willing to recommend the bike device that I have seen in the infographics to friends of mine who are concerned about securing their bikes. | | 0,716 | | | |
| The information offered helps me reconsider the security of my bike. | | 0,703 | | | |
| I am willing to rely on the information conveyed in infographics when making the decision to try the bike device. | | 0,640 | | | |
| I am willing to consider the information conveyed in the infographics when making the decision to try the bike device. | | 0,512 | | | |
| I gave the information a lot of consideration. | | | | | |
| **Perceived Information Value** | | | | | |
| The information offered is good. | | | 0,781 | | |
| The information offered is valuable. | | | 0,774 | | |
| The information offered is useful. | | | 0,728 | | |
| **Message Comprehension** | | | | | |
| I was able to comprehend the claims. | | | | 0,864 | |
| The claims made in the infographics were easy to understand. | | | | 0,769 | |
| (r) The ad claims were hard to understand. | | | | 0,760 | |
| **Ad Message Involvement** | | | | | |
| I thought about my own experience with bike use when I looked at the information. | | | | | 0,756 |
| The information stimulated my imagination. | | | | | 0,640 |
| I was able to imagine using the bike device. | | | | | |

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

## 3.8 Overview of the Modified Hypotheses and Research Model

***H1**: When introducing an innovative technological product, Chinese users score higher than users than Western Europeans in **Perceived Information Value***

***H2**: When introducing an innovative technological product, Chinese users score higher than users than Western Europeans in **Willingness to Try***

***H3**: When introducing an innovative technological product, gain-framed messages score higher as opposed to loss-framed messages in **Perceived Information Value***

***H4**: When introducing an innovative technological product, gain-framed messages score higher as opposed to loss-framed messages in **Willingness to Try***

***H5**: When introducing an innovative technological product, message framing has an interaction effect with cultural groups on **Message Comprehension***

***a)** Message Comprehension is higher when the gain-framed messages are presented to Western Europeans as opposed to Chinese;*

***b)** Message Comprehension is higher when the loss-framed messages are presented to Chinese as opposed to Western Europeans.*

***H6**: When introducing an innovative technological product, message framing has an interaction effect with cultural groups on **Perceived Information Value***

***a)** Perceived Information Value is higher when the gain-framed messages are presented to Western Europeans as opposed to Chinese;*

***b)** Perceived Information Value is higher when the loss-framed messages are presented to Chinese as opposed to Western Europeans.*

***H7**: When introducing an innovative technological product, message framing has an interaction effect with cultural groups on **Willingness To Try***

***a)** Willingness To Try is higher when the gain-framed messages are presented to Western Europeans as opposed to Chinese;*

***b)** Willingness To Try is higher when the loss-framed messages are presented to Chinese as opposed to Western Europeans.*

***H8**: When introducing an innovative technological product, layout design has an interaction effect with cultural groups on **Visual Satisfaction***

***a)** Visual Satisfaction is higher when the analytic layout is presented to Western Europeans as opposed to Chinese;*

***b)** Visual Satisfaction is higher when the holistic layout is presented to Chinese as opposed to Western European.*

***H9**: When introducing an innovative technological product, layout design has an interaction effect with cultural groups on **Willingness To Try***

***a)** Willingness To Try is higher when the analytic layout is presented to Western Europeans as opposed to Chinese;*
***b)** Willingness To Try is higher when the holistic layout is presented to Chinese as opposed to Western European.*

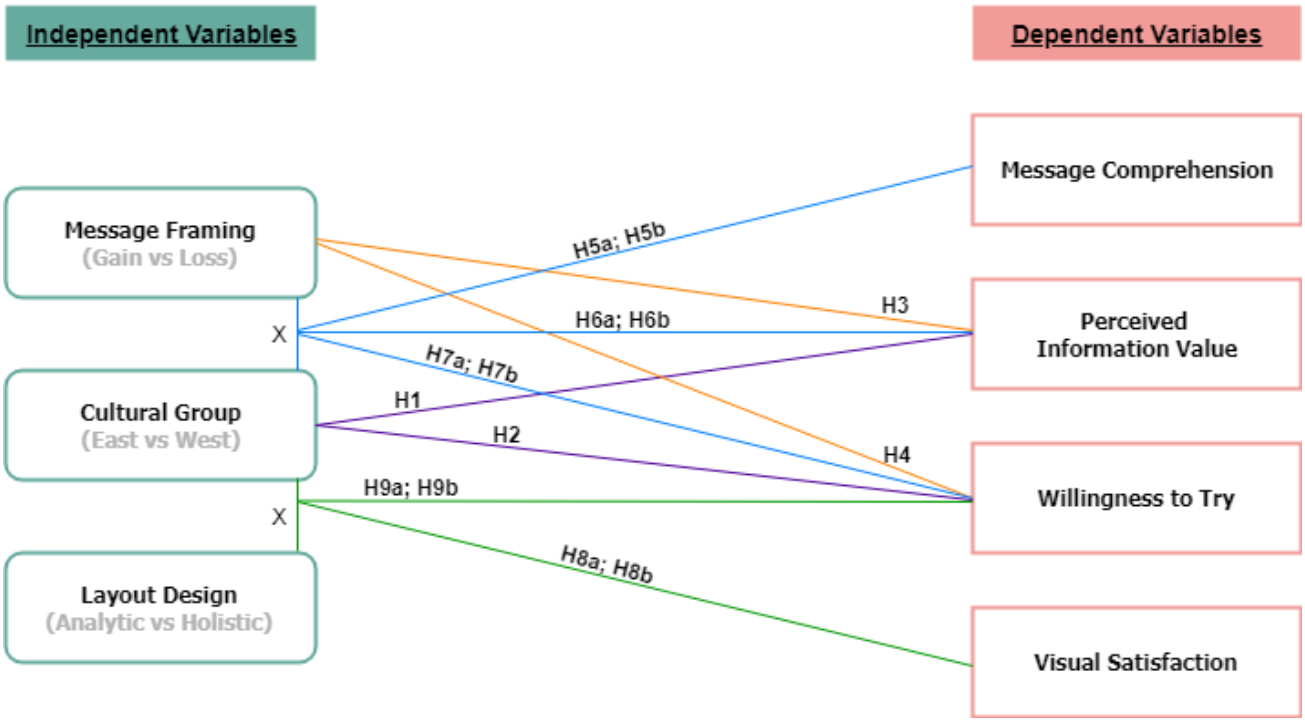



***Figure 3***. *Modified Research Model*

# 4 Results

## 4.1 Manipulation Check

A manipulation check has been carried out and shown in *Table 8* and *Table 9*. For gain-/loss- framing, respondents were asked to indicate to which degree they agreed with the two sets of statements. On the 5-point Likert scales, the overall mean score on the statements "the emphasis of these messages is on the *benefits* you may have from *using* the product" and "I can directly perceive *positive* consequences when using the product" is higher in the gain-framed conditions (M=4.24, SD=0.70) than in loss-framed condition (M=3.69, SD=0.95). While the overall mean score on the statements "the emphasis of these messages is on the *troubles* you may have from *not using* the product" and "I can directly perceive *negative* consequences when *not using* the product" is higher in the loss-framed conditions (M=3.72, SD=0.99) than in the gain-framed condition (M=2.78, SD=1.02). These differences are proved to be statistically significant, t(236)=5.93, p<0.01. Therefore, the manipulation of the message framing stimuli was validated.

***Table 8**: Control Questions on Message Framing*

| Statement | Message Framing Type | N | Mean | SD | Sig. |
|---|---|---|---|---|---|
| The emphasis of these messages is on the benefits you may have from using the product. | Gain | 122 | 4,41 | 0,76 | 0,00 |
| | Loss | 116 | 3,67 | 1,13 | |
| The emphasis of these messages is on the troubles you might have from not using the product. | Gain | 122 | 2,80 | 1,27 | 0,00 |
| | Loss | 116 | 4,03 | 1,12 | |
| I can directly perceive positive consequences when using the product. | Gain | 122 | 4,07 | 0,93 | 0,01 |
| | Loss | 116 | 3,70 | 1,08 | |
| I can directly perceive negative consequences when not using the product. | Gain | 122 | 2,76 | 1,16 | 0,00 |
| | Loss | 116 | 3,41 | 1,34 | |

*Note: The statements were measured on a 5-point Likert scale (1=Disagree/5=Agree)*

For analytic/holistic design, respondents were asked to indicate to what degree they agreed with the two sets of statements on a 5-point Likert scale. The mean scores on the statement "the features are presented in a linear (sequential)/way" is higher in the analytic layout conditions (M=3.66, SD=1.12) than in holistic layout condition (M=3.00, SD=1.17). This difference is statistically significant, t(236)= 4.43, p<0.01. The mean scores on the statement "the features are presented in an integral (interconnected) way" is higher in the holistic layout conditions (M=3.65 SD=1.03) than in analytic layout condition (M=3.34, SD=1.14). The difference is statistically significant, t(236)=2.14, p=0.03. However, the results from another set of statements "when I first look at the layout, my attention is immediately drawn to a specific feature of the product/the six features as a whole" were considered in invalid, due to possible recall bias. Based on the results from the first two statements, the manipulation of the layout design stimuli was considered validated.

***Table 9**: Control Questions on Layout Design*

| Statement | Layout Design Type | N | Mean | SD | Sig. |
|---|---|---|---|---|---|
| The features are presented in a linear (sequential) way. | Analytic | 122 | 3,66 | 1,12 | 0,00 |
| | Holistic | 116 | 3,00 | 1,17 | |
| The features are presented in an integral (interconnected) way. | Analytic | 122 | 3,34 | 1,14 | 0,03 |
| | Holistic | 116 | 3,65 | 1,03 | |
| When I first look at the layout, my attention is immediately drawn to a specific feature of the product. | Analytic | 122 | 2,74 | 1,30 | 0,28 |
| | Holistic | 116 | 2,92 | 1,35 | |
| When I first look at the layout, my attention is immediately drawn to the six features as a whole. | Analytic | 122 | 3,46 | 1,33 | 0,58 |
| | Holistic | 116 | 3,55 | 1,23 | |

*Note: The statements were measured on a 5-point Likert scale (1=Disagree/5=Agree)*

## 4.2 Analysis of Variance

Before conducting a multivariate analysis of variance (MANOVA), the effect of demographic factors has been considered. According to two types of correlation test, namely Pearson' r on the continuous variable Age, and Spearman's on other categorical variables, three dependent variables were found correlated with four of the demographic factors. First, *Visual Satisfaction* is correlated with *Age* [r=-0.28, n=238, p<0.01], *Education Level* [r=-0.18, n=238, p=0.01], *Major area of study* [r=-0.13, n=238, p=0.04] and *Experience of losing one's own bike* [r=0.192, n=238, p<0.01]. Second, *Message Comprehension* is correlated with *Age* [r=-0.15, n=238, p=0.02] and *Experience of losing one's own bike* [r=0.15, n=238, p=0.02]. Third, *Willingness to try* is correlated with *Years stayed in the Netherlands* [r=-0.15, n=238, p=0.02]. Nevertheless, since the results of the Manova tests do not change much with or without adding those four demographic factors, it was decided that the MANOVA test shall be run without a covariate.

***Table 10**. Multivariate analysis of variance (MANOVA)*

| Multivariate test | Independent variables | F | Sig. |
|---|---|---|---|
| Wilks' Lambda | Message Framing | 4,43 | 0,00 |
| | Layout Design | 0,90 | 0,47 |
| | Cultural Groups | 5,17 | 0,00 |
| | Message Framing*Layout Design | 0,54 | 0,71 |
| | Message Framing*Cultural Groups | 1,98 | 0,10 |
| | Layout Design*Cultural Groups | 5,26 | 0,00 |
| | Message Framing*Layout Design*Cultural Groups | 0,46 | 0,77 |

a. Design: Intercept + Age + Education_level + Major_Area_of_Study + Experience_In_Losing_Bike + MessageFraming + LayoutDesign + Cultural_Group + MessageFraming * LayoutDesign + MessageFraming * Cultural_Group + LayoutDesign * Cultural_Group + MessageFraming * LayoutDesign * Cultural_Group

According to the Wilks' Lambda test, message framing (p<0.01) and cultural groups (p<0.01), and the interaction of layout design and cultural groups (p<0.01) have an overall effect on the dependent variables, *Message Comprehension*, *Visual Satisfaction*, *Perceived Information Value* and *Willingness to try*.

***Table 11**:*
*Levene's Test of Equality of Error Variances[a]*

| | F | df1 | df2 | Sig. |
|---|---|---|---|---|
| Message Comprehension | 3,62 | 7 | 230 | 0,00 |
| Information Value | 1,97 | 7 | 230 | 0,06 |
| Visual Satisfaction | 0,84 | 7 | 230 | 0,56 |
| Willingness To Try | 1,81 | 7 | 230 | 0,09 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + MessageFraming + LayoutDesign + Cultural_Group + MessageFraming * LayoutDesign + MessageFraming * Cultural_Group + LayoutDesign * Cultural_Group + MessageFraming * LayoutDesign * Cultural_Group

For all dependent variables, the Levene's Test (*Table 11*) showed that there was no difference in variances in each experimental condition, except for message comprehension ($p<0.01$). This missing of equal variance will be considered when analysing the result on message comprehension. Below is an overview of the tests-between subjects effects, most of the effect size was small ($\eta p^2<0.13$).

***Table 12*:**
*Tests of Between-Subjects Effects*

| Dependent Variables | Independent Variables | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|
| Message Comprehension | Message Framing | 3,10 | 0,08 | 0,01 |
| | Layout Design | 0,69 | 0,41 | 0,00 |
| | Cultural Group | 4,58 | 0,03 | 0,02 |
| | Message Framing*Layout Design | 0,12 | 0,73 | 0,00 |
| | Message Framing*Cultural Group | 4,87 | 0,03 | 0,02 |
| | Layout Design*Cultural Group | 7,98 | 0,01 | 0,03 |
| | Message Framing*Layout Design*Cultural Group | 0,08 | 0,78 | 0,00 |
| Information Value | Message Framing | 14,67 | 0,00 | 0,06 |
| | Layout Design | 0,00 | 0,95 | 0,00 |
| | Cultural Group | 0,60 | 0,44 | 0,00 |
| | Message Framing*Layout Design | 0,02 | 0,90 | 0,00 |
| | Message Framing*Cultural Group | 0,03 | 0,87 | 0,00 |
| | Layout Design*Cultural Group | 8,60 | 0,00 | 0,04 |
| | Message Framing*Layout Design*Cultural Group | 0,99 | 0,32 | 0,00 |
| Visual Satisfaction | Message Framing | 11,08 | 0,00 | 0,05 |
| | Layout Design | 1,87 | 0,17 | 0,01 |
| | Cultural Group | 4,06 | 0,04 | 0,02 |
| | Message Framing*Layout Design | 0,27 | 0,61 | 0,00 |
| | Message Framing*Cultural Group | 0,02 | 0,88 | 0,00 |
| | Layout Design*Cultural Group | 19,98 | 0,00 | 0,08 |
| | Message Framing*Layout Design*Cultural Group | 0,30 | 0,58 | 0,00 |
| Willingness To Try | Message Framing | 5,24 | 0,02 | 0,02 |
| | Layout Design | 0,04 | 0,84 | 0,00 |
| | Cultural Group | 4,28 | 0,04 | 0,02 |
| | Message Framing*Layout Design | 1,54 | 0,22 | 0,01 |
| | Message Framing*Cultural Group | 0,86 | 0,35 | 0,00 |
| | Layout Design*Cultural Group | 5,21 | 0,02 | 0,02 |
| | Message Framing*Layout Design*Cultural Group | 0,29 | 0,59 | 0,00 |

### 4.3.1 Message Comprehension

The results from the analysis of variance on *Message Comprehension* show that there was a main effect of cultural group (F=4.58, p=0.03, $\eta p^2$=0.02). The Western European group (M=4.52, SD=0.60) scored higher than the Chinese group (M=4.32, SD=0.76) in message comprehension.

***Table 13**: Mean Score Message Comprehension*

| | | Gain | Loss | Total |
|---|---|---|---|---|
| **Analytic** | **East** | **4,15 (0,95)** | **4,18 (0,64)** | 4,17 (0,81) |
| | **West** | **4,80 (0,35)** | **4,40 (0,73)** | 4,60 (0,60) |
| | Combined | 4,47 (0,78) | 4,29 (0,69) | 4,39 (0,74) |
| **Holistic** | **East** | **4,46 (0,66)** | **4,51 (0,68)** | 4,49 (0,67) |
| | **West** | **4,57 (0,57)** | **4,28 (0,57)** | 4,45 (0,58) |
| | Combined | 4,52 (0,61) | 4,40 (0,64) | 4,47 (0,62) |
| **Total** | | 4,50 (0,70) | 4,35 (0,67) | 4,42 (0,69) |

*Note: i. The statements were measured on a 5-point Likert scale (1=Disagree/5=Agree)*
*ii. Mean score and standard deviation of the eight conditions are in bold*

Moreover, the interaction effect between cultural group and message framing (F=4.87, p=0.03, $\eta p^2$=0.02) was found significant on message comprehension. When being presented with the gain-framed messages, Western European participants (M=4.68, SD=0.49) scored higher in message comprehension than participants from the Greater China region (M=4.29, SD=0.84). This difference was significant, t(87)=-3.05, p<0.01. While being exposed to the loss-framed messages, the difference between Western Europeans (M=4.35, SD=0.66) and Chinese (M=4.35, SD=0.68) was not significant, t(114)=0.04, p=0.97.

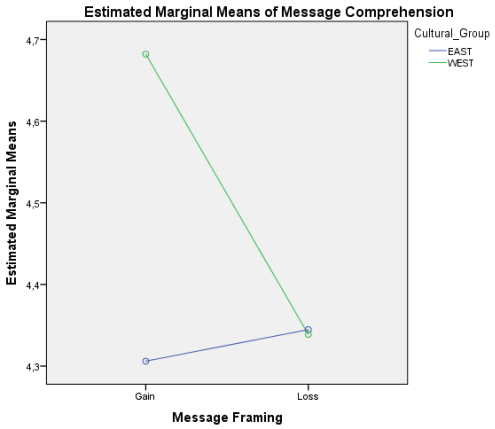



***Figure 4**. Interaction effect between message framing and cultural group on Message Comprehension*

The interaction effect between cultural group and layout design on message comprehension, though was not hypothesised, was found to be significant (F=7.98, p=0.01, $\eta p^2$=0.03). When receiving the infographics in analytic layout, Western European participants (M=4.60, SD=0.60) scored higher in message comprehension than participants from the Greater China region (M=4.17, SD=0.80), t(109)=-3.33, p< 0.01. While if exposed to a piece of infographics in the holistic

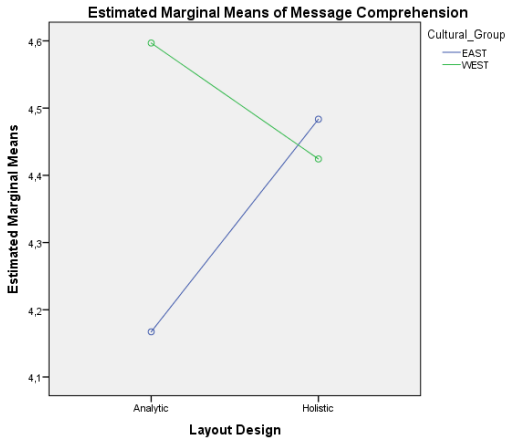



***Figure 5**. Interaction effect between layout design and cultural group on Message Comprehension*

layout, the difference between Western Europeans (M=4.45, SD=0.58) and Chinese (M=4.49, SD=0.68) was not significant, t(114)=3.36, p=0.74.

### 4.3.2 Perceived Information Value

***Table 14**: Mean Information Value*

| | | Gain | Loss | Total |
|---|---|---|---|---|
| **Analytic** | **East** | **4,17 (0,67)** | **3,75 (0,79)** | 3,97 (0,75) |
| | **West** | **4,44 (0,51)** | **4,17 (0,67)** | 4,31 (0,61) |
| | Combined | 4,31 (0,71) | 3,97 (0,75) | 4,14 (0,70) |
| **Holistic** | **East** | **4,36 (0,71)** | **4,10 (0,70)** | 4,22 (0,71) |
| | **West** | **4,26 (0,70)** | **3,79 (0,99)** | 4,06 (0,86) |
| | Combined | 4,31 (0,70) | 3,96 (0,85) | 4,14 (0,79) |
| **Total** | | 4,31 (0,65) | 3,96 (0,80) | 4,14 (0,74) |

*Note: The statements were measured on a 5-point Likert scale (1=Disagree/5=Agree)*
*ii. Mean score and standard deviation of the eight conditions are in bold*

The results from the analysis of variance on *Perceived Information Value* indicated that there was a main effect of message framing (F=14.67, p<0.01, $\eta p^2$=0.06). Participants that exposed to the gain-framed message (M=4.31, SD=0.65) scored higher than the ones that exposed to the loss-framed message (M=3.96, SD=0.80). There was no effect from the cultural group on *Perceived Information Value* (F=0.60, p=0.44, $\eta p^2$<0.01), scores between Chinese (M=4.09, SD=0.74) and Western European (M=4.19, SD=0.75) were close.

Also, there was no interaction between message framing and cultural group on perceived information value (F=0.03, p= 0.87, $\eta p^2$<0.01). However, an unexpected interaction effect between cultural group and layout design was found on perceived information value (F=8.60, p< 0.01, $\eta p^2$=0.04). As can be seen in *Table 14*, although the overall scores of information value in both layout versions were the same (M=4.14), Western European perceived higher informative value in the analytic version (M=4.31, SD=0.61), while Chinese participants perceived higher informative value in the holistic version (M=4.22, SD=0.71). Moreover, the difference between the two cultural groups in the analytic condition was significant, t(120)=-2.75, p=0.01, while in the holistic condition were not statistically significant, t(114)=1.05, p=0.30.

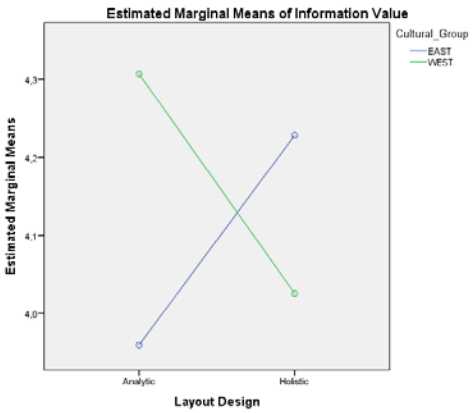



***Figure 6**. Interaction effect between layout design and cultural group on perceived information value*

### 4.3.3 Visual Satisfaction

Although no main effect on visual satisfaction was hypothesised previously, the effect of message framing ($F=11.08$, $p<0.01$; $\eta p^2=0.05$) and the effect of cultural group ($F=4.06$, $p=0.05$, $\eta p^2=0.02$) were found significant. Participants that exposed to the gain condition ($M=4.08$, $SD=0.72$) scored higher than the ones that exposed to the loss condition ($M=3.78$, $SD=0.81$) and that the Western European group ($M=4.04$, $SD=0.70$) had greater *Visual Satisfaction* over the infographics than the Chinese group ($M=3.38$, $SD=0.84$).

***Table 15**: Mean Visual Satisfaction*

| | | Gain | Loss | Total |
|---|---|---|---|---|
| **Analytic** | **East** | **3,77 (0,81)** | **3,34 (0,75)** | 3,56 (0,80) |
| | **West** | **4,33 (0,55)** | **4,03 (0,66)** | 4,18 (0,62) |
| | Combined | 4,05 (0,74) | 3,69 (0,78) | 3,88 (0,78) |
| **Holistic** | **East** | **4,23 (0,76)** | **4,00 (0,82)** | 4,11 (0,79) |
| | **West** | **4,03 (0,67)** | **3,73 (0,86)** | 3,90 (0,76) |
| | Combined | 4,12 (0,71) | 3,88 (0,84) | 4,00 (0,78) |
| **Total** | | 4,08 (0,72) | 3,78 (0,81) | 3,94 (0,78) |

*Note: The statements were measured on a 5-point Likert scale (1=Disagree/5=Agree)*
*ii. Mean score and standard deviation of the eight conditions are in bold*

The interaction effect of cultural group and layout design was found significant ($F=19.98$, $p<0.01$, $\eta p^2=0.08$) on perceived visual satisfaction. When messages were organised in an analytic-oriented version, the Western European group had higher Visual Satisfaction ($M=4.18$, $SD=0.62$), compared to their Chinese counterparts ($M=3.56$, $SD=0.80$), $t(120)=-4.72$, $p<0.01$. However, when seeing messages organised in a holistic version, the difference between the two cultural groups was not significant, $t(114)=1.39$, $p=0.17$.

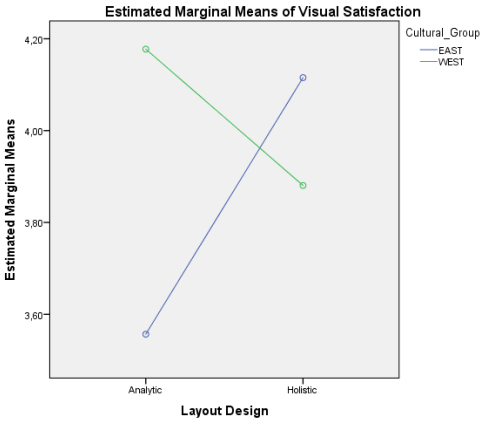



***Figure 7**. Interaction effect between layout design and cultural group on Visual Satisfaction*

Moreover, within the Western group, higher visual satisfaction had been perceived in the analytic version ($M=4.18$, $SD=0.62$), than the holistic version ($M=3.90$, $SD=0.76$), $t(119)=2.17$, $p=0.03$. Vice versa, within the Chinese group, higher visual satisfaction had been perceived in the holistic version ($M=4.11$, $SD=0.79$), than the analytic version ($M=3.56$, $SD=0.80$), $t(115)=-3.67$, $p<0.01$.

### 4.3.4 Willingness to Try

***Table 16**: Mean Willingness to try*

| | | Gain | Loss | Total |
|---|---|---|---|---|
| **Analytic** | **East** | **3,93 (0,63)** | **3,59 (0,71)** | 3,77 (0,68) |
| | **West** | **3,99 (0,70)** | **3,57 (0,96)** | 3,78 (0,86) |
| | Combined | 3,96 (0,66) | 3,58 (0,84) | 3,78 (0,77) |
| **Holistic** | **East** | **3,96 (0,91)** | **4,01 (0,80)** | 3,99 (0,84) |
| | **West** | **3,65 (0,80)** | **3,38 (1,04)** | 3,54 (0,91) |
| | Combined | 3,79 (0,86) | 3,73 (0,96) | 3,76 (0,90) |
| **Total** | | 3,88 (0,77) | 3,65 (0,90) | 3,77 (0,84) |

*Note: The statements were measured on a 5-point Likert scale (1=Disagree/5=Agree)*
*ii. Mean score and standard deviation of the eight conditions are in bold*

The results from the analysis of variance on *Willingness To Try* show that the effect of message framing ($F=5.24$, $p=0.02$, $\eta p^2=0.02$) and the effect of cultural group ($F=4.28$, $p=0.04$, $\eta p^2=0.02$) were significant on willingness to try. Participants that exposed to the gain-framed message (M=3.88, SD=0.77) scored higher than the ones that exposed to the loss-framed message (M=3.65, SD=0.90). The Chinese group (M=3.87, SD=0.77) scored higher in *Willingness To Try* than their western counterparts (M=3.66, SD=0.89).

The interaction effect between cultural group and layout design was found significant ($F=4.36$, $p=0.04$, $\eta p^2=0.02$) on a willingness to try. When seeing messages organised in an analytic-oriented version, the difference between "West" (M=3,77, SD=0.68) and "East" (M=3.78, SD=0.86) cultural groups was not significant, $t(120)=-0.12$, $p=0.90$. When it comes to the holistic layout version, East group scored significantly higher (M=3.99, SD=0.84) than their western counterparts (M=3.54, SD=0.91), $t(114)=2.74$, $p=0.01$.

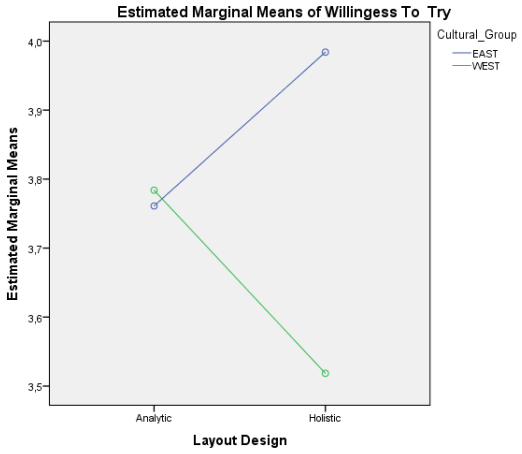



***Figure 8**. Interaction effect between layout design and cultural group on Willingness to Try*

The interaction between cultural group and message framing was, nevertheless, not found significant ($F=0.86$, $p=0.35$, $\eta p^2=0.00$) on a willingness to try. When seeing the loss-framed messages, Chinese (M=3.81, SD=0.78) scored higher than Western Europeans (M=3,49, SD=0.99), but the difference was barely significant, $t(104)=1.91$, $p=0.06$. When it comes to the gain-framed messages, opposite to the hypothesis 8a, as the Chinese group scored higher (M=3.94, SD=0.76) than their western counterparts (M=3.82, SD=0.77), yet the difference was not significant $t(120)=0.99$, $p=0.36$. This result, however, provides partial support for hypothesis 1 which stated that Chinese users score higher in the overall willingness to try out the product.

## 4.4 Overview of Tested Hypotheses

***Table 17:*** *Overview of Tested Hypotheses*

| | Hypotheses | Result |
|---|---|---|
| **H1** | When introducing an innovative technological product, Chinese users score higher than users than Western Europeans in Information Value | Not Supported |
| **H2** | When introducing an innovative technological product, Chinese users score higher than users than Western Europeans in Willingness to Try | Supported |
| **H3** | When introducing an innovative technological product, gain-framed messages score higher as opposed to loss-framed messages in Perceived Information Value | Supported |
| **H4** | When introducing an innovative technological product, gain-framed messages score higher as opposed to loss-framed messages in Willingness to Try | Supported |
| **H5** | When introducing an innovative technological product, message framing has an interaction effect with cultural groups on Message Comprehension | Supported |
| | **a)** Message Comprehension is higher when the gain-framed messages are presented to Western Europeans as opposed to Chinese. | Supported |
| | **b)** Message Comprehension is higher when the loss-framed messages are presented to Chinese as opposed to Western Europeans. | Not Supported |
| **H6** | When introducing an innovative technological product, message framing has an interaction effect with cultural groups on perceived Information Value | Not Supported |
| | **a)** perceived Information Value is higher when the gain-framed messages are presented to Western Europeans as opposed to Chinese. | Not Supported |
| | **b)** perceived Information Value is higher when the loss-framed messages are presented to Chinese as opposed to Western Europeans. | Not Supported |
| **H7** | When introducing an innovative technological product, message framing has an interaction effect with cultural groups on Willingness To Try | Not Supported |
| | **a)** Willingness To Try is higher when the gain-framed messages are presented to Western Europeans as opposed to Chinese. | Not Supported |
| | **b)** Willingness To Try is higher when the loss-framed messages are presented to Chinese as opposed to Western Europeans. | Not Supported |
| **H8** | When introducing an innovative technological product, layout design has an interaction effect with cultural groups on Visual Satisfaction | Supported |
| | **a)** perceived Visual Satisfaction is higher when the analytic layout is presented to Western Europeans as opposed to Chinese. | Supported |
| | **b)** perceived Visual Satisfaction is higher when the holistic layout is presented to Chinese as opposed to Western European. | Not Supported |
| **H9** | When introducing an innovative technological product, layout design has an interaction effect with cultural groups on Willingness To Try | Supported |
| | **a)** Willingness To Try is higher when the analytic layout is presented to Western Europeans as opposed to Chinese. | Not Supported |
| | **b)** Willingness To Try is higher when the holistic layout is presented to Chinese as opposed to Western European. | Supported |

# 5. Discussion and Conclusion

The objective of this research is to investigate the extent textual and visual design elements in the product introductory ads influence the strength of communication, covering message comprehension, visual satisfaction, perceived information value and willingness to try the innovative product on consumers with different cultural attributes, such as dominant regulatory focus and cognitive navigation styles. This chapter is going to elaborate on the Manova test results.

## 5.1 General Discussion of the Results

An interaction effect was found between message framing and cultural groups on message comprehension, yet the significance differs among cultural groups. On the one hand, Western Europeans scored significantly higher when comprehending messages in gain-framed messages. This result supports previous empirical studies regarding the congruency between regulatory foci, and message framing and individual' cultural backgrounds when it comes to westerners (Lee & Aaker, 2004). On the other hand, such congruency was not found among Chinese participants as their comprehension on ad messages do not vary much between two types of message framing. Although the Chinese participants did score higher than westerners when comprehending loss-framed messages, the difference was not statistically significant. This contradicts previous empirical studies which have suggested that loss-framed, fitting the dominant regulatory focus of Chinese (prevention-focus), should lead to significantly higher comprehension of the messages among Chinese users (Ho & Chuang, 2012). However, in Ho and Chuang's research (2012), they focused only on people from the Taiwan region, so that the experiment material was in participant's native language – Chinese, while in the current study, Chinese participants received the experimental material in English. Moreover, since the Gain version has a shorter text in the infographics than the Loss version, it might be easier for the Chinese participants to comprehend the message.

In addition, although it was not hypothesised, the interaction effect between layout design and cultural groups on message comprehension has been found. In the holistic layout condition, the difference between Western Europeans and Chinese was not significant, whereas, in the analytic layout condition, Western European participants scored significantly higher in message comprehension than participants from the Greater China region. The results indicated that layout design seemed to play a mediating role which facilitates individuals in comprehending messages, especially for westerners. Although few research state that layout design has a mediating effect on message comprehension, the interaction effect between message and the executional characteristics of the messages (i.e layout design in this study) was found regarding advertising perception (Mitchell, 1979; Muehling et al., 1991). According to the scholars, when an individual scores low in perception of the message, but high

in the executional characteristics of the messages, there could be a *contextual evaluation transfer (CET),* which affects the strengths of the relationships between ad perception and the perception of the message (MacKenzie & Lutz, 1989; Muehling et al., 1991). Hence, navigation schemes may not only affect the perceptual response such as visual satisfaction but also indirectly affect the conceptual response of the message, such as message comprehension.

In fact, Western Europeans do have a higher visual satisfaction of the product advertisement when seeing the infographics in an analytic style that suggests a clear starting point of reading, while Chinese have a different taste – they preferred the holistic-oriented layout that has no clear reading order. This result is in line with previous studies. First, it is consistent with the argument of Alexander et al. (2017) that users from low uncertainty countries are likely to prefer less control in navigation, whereas users from high-uncertainty avoidance countries seek a rather formal navigation structure to prevent them from getting lost. Second, it is in line with the results of Kralisch et al. (2005) that users from monochromic cultures, often with a single task focus, prefer linear and hierarchical structures, whereas users from polychromic cultures prefer parallel structures as they used to multi-tasking. Third, it supports Cyr's argument that navigation schemes influence trust and satisfaction, mediated by culture (2008).

Nonetheless, the effect of message framing on visual satisfaction was unexpected, as the gain condition was significantly higher in visual satisfaction. A possible reason could be that, although the researcher attempted to keep the word count of both gain-framed messages and loss-framed messages similar to each other, the fact that the gain-framed text had fewer words than the loss-framed text might give the impression that it is tidier and easier to read.

Speaking of perceived information value (PIV), the predicted relation between message framing and PIV was supported, with gain-framed messages leading to higher perceived information value. This is supported by previous studies that stated that gain-messages are associated with accepting a sustainable product that requires a long-term possession (Balbo & Jeannot, 2015). The predicted interaction effect between cultural groups and message framing on PIV was rejected but the interaction effect between layout design and cultural groups on information value was found. These results, in line with previous discussions on the *contextual evaluation transfer*, again highlighted the importance of executional elements of the message on ad perception, which in this case, the effect of layout design on perceived information value. Furthermore, the predicted relation between cultural groups and perceived information value was rejected as the two cultural groups scored about the same on PIV. In fact, the perceived information value might be moderated by demographic factors such as

"Years stayed in the Netherlands" and "Experience of losing one's own bike", so that peoples' cultural background was not that important, which is one of the limits of this study.

Despite having no significant differences in perceived information value from their western counterparts, Chinese were more willing to try the device. This is in line with the prediction of Hofstede (1980) that Chinese, scoring relatively low in uncertainty avoidance, has more of an entrepreneurial mind to try out new technology. Also, the effects of message framing on willingness to try (WtT) was manifested, as the gain-framed messages led to higher WtT. This is in line with Chang's research (2003), in which he argued that when the product is new to consumers, positively framed messages would be more effective than negatively framed ones. However, cultural groups and message framing has no interaction effect on WtT, as the gain-framed messages have a greater impact on accepting an innovative product among both Western European and Chinese consumers. This contradicts the previous conclusion that Chinese consumers, whose dominant regulatory type is prevention-focused, tended to be persuaded with loss-framed messages. Nevertheless, previous studies mainly focused on health messages (Uskul et al., 2009), green advertising (Xue, 2015) and personal feedback (Kung et al., 2016), rather than an innovative tech product. Future studies could further examine whether product characteristics (innovative vs existing) might mediate the regulatory fit between different cultures. Furthermore, the interaction effect between cultural groups and layout design on Willingness to Try has been found. This strengthens and extends the previous argument that navigation schemes may not only affect the perceptual response such as visual satisfaction, the conceptual response such as message comprehension, but it may also have an integrated effect on the general conative response towards the product advertised.

## 5.2 Limitations and Suggestions for Future Research

In this section, limitations of this study and suggestions for future study will be elaborated. Firstly, as briefly mentioned in the section above, the lack of analysing possible moderating effect from some of the demographic factors is a limitation. Secondly, the majority of the surveyed participants were not English native speakers, and the English proficiency of the participants was not controlled. This might influence the comprehension level the messages in the infographics of the participants. Thirdly, the demographic variable "years living in the Netherlands" was introduced in order to see whether environment have an impact on cultural groups' dominant regulatory type or cognitive styles. However, it was later found that this variable was not accurately formulated. For example, a Chinese participant could be new to the Netherlands but have lived in Germany for some years previously. In this case, his or her experience of living in the western society might also had an influence, while this was neglected when being asked "years lived in the Netherlands". Future studies can better control

the previous experience of living in the western society of Chinese individuals to see the influence of the living environment.

Another type of limitation is about the limited manipulation of the design elements in the infographics. Firstly, the word count of the gain and loss framing conditions had a difference which might influence the message comprehension and visual satisfaction. Secondly, the actual layout design was based on the researcher's own interpretation of the differences between analytic and holistic versions of the design based on previous studies (Nisbett & Norenzayan, 2002; Dong & Lee; 2008; Faiola & MacDorman, 2008), which may include subjective judgements to some extent. Secondly, due to the limited scope of this research, the influence of other design elements have not been included, such as colours, on different cultural groups (Faiola & Macdorman, 2008; Alexander et al., 2017). Thirdly, derived from web navigation design, the layout design in this research was limited to a still image – a piece of infographics. In fact, user interactions that might appear in web design have not been considered, such as sitemaps. Future studies could expand the layout design to more interactive web designs and use eye-tracking method to better track cross-cultural users reactions to the manipulated content design elements. Also, when validating the design ideas, practitioners could gain insights from rapid online experimentations or usability tests to receive fast feedback on infographics design, compared to the time-consuming questionnaires.

When it comes to users' acceptance towards new technology, most of the studies utilised the *Technology Acceptance Model (TAM)* or the *Unified Theory of Acceptance and Use of Technology (UTAUT)*, of which the ease of use and perceived usefulness has been measured (Davis et al., 1989; Venkatesh et al. 2003). For the product in this research, the anti-theft device for bicycle remains a concept without a solid product prototype. Therefore, ease of use could not be measured and perceived usefulness was replaced by the perceived information value, due to a focus on the persuasiveness of the communication. For the next stage of this innovative product, researchers could draw on TAM or UTAUT to get more perceived product values between consumers from a different culture, when a product prototype is further developed. Moreover, future studies could measure detailed constructs regarding consumer habits, status quo bias, switching costs and risk perception, when analysing the innovation resistance in the decision-making process of consumers across different cultures.

## 5.3 Theoretical and Practical Implications

Following a deductive approach, this study is among the first demonstrations of manipulating both textual and visual design elements when it comes to the ads on an innovative tech product. This research extends knowledge about the effect of framed advertising and digital layout design in cross-

cultural users' propensity to accept an innovative tech product. Cross-cultural users' dominant regulatory focus type and messages framing types partially supported previous studies, as Western Europeans were appeal to gain-framed messages rather than loss-framed messages, while the type of message framing do not have an influence on Chinese cultural group when it comes to message comprehension. Moreover, while message framing was expected to interact with cultural groups to have an effect on perceived information value and willingness to try, it was the interaction between layout design and cultural groups that exerted such effects. Thus, the match between cultural groups' cognitive styles that drive navigations and the layout design is considered rather robust and impactful.

Speaking of practical value, the study results have direct implications for the anti-theft device for bicycles as designed by Jaimil Patel. Over forty per cent of the surveyed participants stated that they had experience of losing their bikes, which indicated that there is a potential market of the anti-theft device for bicycles for residents in the Netherlands. Between two studied cultural groups, the Chinese participants have a higher intention to try the device, which may result in marketing strategy to focus on the expats in the Netherlands of whose country of origin scores low in uncertainty avoidance, according to Hofstede (1980). Regarding the design of the infographics that introduce the product features, this research suggests that it is advisable to present the gain-framed product features to potential users, regardless of their cultural backgrounds. Furthermore, it is suggested to put the messages in an analytic-oriented layout when approaching Western European users, and in a holistic-oriented layout when reaching out to individuals from the Greater China region. Also, this research provides value for future entrepreneurial students and industry stakeholders who have ideas of designing innovative products for cross-cultural users. When elaborating the product features over infographics or a website, cultural differences, such as navigation habits, should be considered as part of a usability test. When hiring a local designer to design website could be appropriate yet costly, learning the differences in cultural cognitive styles and the corresponding design suggestions could be an alternative to designers.

## 5.4 Conclusions

Higher message comprehension, higher visual satisfaction, greater perceived information value, and greater willingness to try have been observed, when information is organised in analytic layout for Western Europeans, and when information is organised in holistic layout for Chinese. This made the fit between navigation design types and cultural cognitive styles of the recipients significantly important. Based on the results, the research question can be answered: while the match between message framing and dominant regulatory focus of a particular culture is important in bringing effective message comprehension, the match between layout and cultural cognitive styles are more impactful in the perception of the advertisement and more powerful in exerting persuasiveness.

## 6 Acknowledgement

My sincere thankfulness goes to my dedicated and supportive supervisor, Dr. Joyce Karreman, and second reader Qian Li, MSc - thank you for your clear guidance and insightful feedback throughout the whole process. I would like to thank Jaimil Patel for briefing me on his project and collaborating with me on the design of the stimulus material. A profound thank you is extended to all the respondents who were kind enough to take part in the experiment. My gratitude goes to my dear parents (Naonao & Nvshen) and friends – Jie, Luiza, Pan, Sara, Seleen, Xinyi, Zhanxu, Zoe, thank you so much for your warm support. I want to thank myself, for overcoming not only the academic challenges but also the psychological difficulties. Lastly, a special acknowledgement goes to my dear pet friends, Meng The Piggy and Jessica The Puppy, thank you for bringing me all those sweet, sour and spicy memories along this bitter journey.

# 7 References


Abel, T., Hsu, F. (1949). Some aspects of personality of Chinese as revealed by the Rorschach Test. *Rorschach Research Exchange And Journal of Projective Techniques*, *13*(3), 285-301.

Aydin, A. (2018). Processing fluency: examining its relationship with thinking style and purchase intention. *Journal of Marketing Communications*, *24*(6), 588-598.

Alexander, D., Lynch, J., Wang, Q. (2008). As Times Goes By: Do Cold Feet Follow Warm Intentions for Really New Versus Incrementally New Products? *Journal of Marketing Research*, 45 (3), 307-19

Alexander, R., Thompson, N., Murray, D. (2017). Towards cultural translation of websites: a large-scale study of Australian, Chinese, and Saudi Arabian design preferences. *Behaviour & Information Technology,* **36**:4, 351-363, DOI: 10.1080/0144929X.2016.1234646

Arora, R. (2007). Message framing strategies for new and mature products. *Journal of Product & Brand Management*, *16*(6), 377-385.

Balbo, L., Jeannot, F. (2015). The fit between message framing and temporal distance: An efficient way to promote an innovative product. *Recherche et Applications en Marketing (English Edition)*, 30(1), 28-49.

Bruner II, G. (2012). *Marketing Scales Handbook*. Volume 6. GCBII Productions, LLC.

Calabrese, A., Capece, M. Corbò, N. Ghiron, and M. Marucchi, M. (2012).“Cross-cultural Strategies for Web Design.” World Academy of Science, Engineering and Technology, *International Journal of Social, Business*, Psychological, Human Science and Engineering 6 (11): 437–442.

CBS. (2015). Veiligheidsmonitor 2015. *Centraal Bureau voor de Statistiek (CBS)*. Retrieved from *CBS*'s website on 15 June 2018: http://download.cbs.nl/pdf/veiligheidsmonitor-2015.pdf

Cesario, J., Grant, H., Higgins, E. (2004). Regulatory Fit and Persuasion: Transfer From "Feeling Right." *Journal of Personality and Social Psychology, 86*(3), 388-404.

Cho, M., Sung, H. (2012). Travel destination websites: Cross-cultural effects on perceived information value and performance evaluation. *Journal of Travel & Tourism Marketing*, *29*(3), 221-241.

Choi, I., Choi, J., Norenzayan, A. (2004). Culture and decisions. *Blackwell Handbook of Judgment and Decision Making*, 504-524.

Chu, P., & Spires, E. (2008). The Cost-Benefit Framework and Perceptions of Decision Strategies: A Comparison of China and the United States. *Journal of Cross-Cultural Psychology*, *39*(3), 303-308.

CIA. Which Countries Are Considered Western Europe? *WorldAtlas.* Retrieve on 1 July 2018 from WorldAtlas' website: https://www.worldatlas.com/articles/what-countries-are-considered-western-europe.html

Cyr, D., & Trevor-Smith, H. (2004). Localization of Web design: An empirical comparison of German, Japanese, and United States Web site characteristics. *Journal of the American Society for Information Science and Technology*, 55 (13), 1199-1208.

Davis, F., Bagozzi, R., Warshaw, P. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management science*, *35*(8), 982-1003.

Dewar, R., Dutton, J. (1986). The adoption of radical and incremental innovations: an empirical analysis. *Management Science*. 32 (11), 1422-33

Dong, Y., Lee, K. (2008). A cross-cultural comparative study of users' perceptions of a webpage: With a focus on the cognitive styles of Chinese, Koreans and Americans. *International Journal of Design, 2*(2), 19-30.

Ettlie, J. Bridges, W., O'Keefe, R. (1984). Organization strategy and structural differences for radical versus incremental innovation. *Management Science*, 30 (6), 682-95

Faiola, A., Matei, S. (2005). Cultural cognitive style and web design: Beyond a behavioral inquiry into computer-mediated communication. *Journal of Computer-Mediated Communication*, *11*(1), 375-394.

Graf, L., Mayer, S., Landwehr, J. (2018). Measuring processing fluency: One versus five items. *Journal of Consumer Psychology*, *28*(3), 393-411.

Hall, E., Hall, M. (1990). *Understanding cultural differences:[Germans, French and Americans]* (Vol. 9). Yarmouth, ME: Intercultural press.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*(12), 1280.

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In *Advances in Experimental Social Psychology* (Vol. 30, pp. 1-46). Academic Press.

Higgins, E. T. (2000). Making a good decision: value from fit. *American Psychologist*, *55*(11), 1217.

Higgins, E. T. (2002). How self-regulation creates distinct values: The case of promotion and prevention decision making. *Journal of Consumer Psychology*, *12*(3), 177-191.

Higgins, E. T. (2005). Value from regulatory fit. *Current Directions in Psychological Science*, *14*(4), 209-213.

Higgins, E. T. (2006). Value from hedonic experience and engagement. *Psychological Review*, *113*(3), 439.

Ho, S., Chuang, S. (2012). The influence of lay theories of Feng Shui on consumers' peace of mind: The role of regulatory fit. *Asian Journal of Social Psychology*, *15*(4), 304-313.

Hoeffler, S. (2003). Measuring preferences for really new products. *Journal of Marketing Research*, 40 (4), 406-420.

Hoffman, D., Novak, T. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *The Journal of Marketing*, 50-68.

Hofstede, G. (1980). Culture's Consequences: International Differences in Work-Related Values. Beverly Hills, *CA: Sage*.

Hofstede, G. (2011). Dimensionalizing Cultures: The Hofstede Model in Context. *Online Readings in Psychology and Culture, 2*(1). https://doi.org/10.9707/2307-0919.1014

Holbrook, M. B. (1994). The nature of customer value: an axiology of services in the consumption experience. *Service quality: New directions in theory and practice* (pp. 21–71). Thousand Oaks, *CA: Sage*.

Holzwarth, M., Janiszewski, C., Neumann, M. (2006). The influence of avatars on online consumer shopping behavior. *Journal of Marketing*, *70*(4), 19-36.

Hsu, C., Chen, M. (2014). Explaining consumer attitudes and purchase intentions toward organic food: Contributions from regulatory fit and consumer characteristics. *Food Quality and Preference*, *35*, 6-13.

Im, H., Lennon, S. J., Stoel, L. (2010). The perceptual fluency effect on pleasurable online shopping experience. *Journal of Research in Interactive Marketing*, *4*(4), 280-295.

Janiszewski, C. (1990). The influence of print advertisement organization on affect toward a brand name. *Journal of Consumer Research*, *17*(1), 53-65.

Kitayama, S., Duffy, S., Kawamura, T., Larsen, J. (2003). Perceiving an object and its context in different cultures: A cultural look at new look. *Psychological Science*, *14*(3), 201-206.

Kobbeltvedt, T. (2017). 21. Leadership, trust and UX design: a regulatory focus perspective. *Innovating for Trust*, 322. *Edward Elgar Publishing.*

Kotler, P., Keller, K. (2006). Marketing management 12e. *New Jersey*.

Kralisch, A., Eisend, M., Berendt, B. (2005, July). Impact of culture on website navigation behaviour. In *Proc. HCI-International* (pp. 1-9).

Kristensson, P., Nysveen, H., Thorbjørnsen, H. (2017). 23. Why customers do and do not switch. *Innovating for Trust*, 353. *Edward Elgar Publishing.*

Kung, F., Kim, Y. H., Yang, D., Cheng, S. (2016). The role of regulatory fit in framing effective negative feedback across cultures. *Journal of Cross-Cultural Psychology*, *47*(5), 696-712.

Kurila, J., Lazuras, L., Ketikidis, P. H. (2016). Message framing and acceptance of branchless banking technology. *Electronic Commerce Research and Applications*, *17*, 12-18.

Kurman, J., Hui, C. M. (2011). Promotion, prevention or both: regulatory focus and culture revisited. *Online Readings in Psychology and Culture*, *5*(3), 3.

Kwon, W., Lennon, S. (2009). Reciprocal effects between multichannel retailers' offline and online brand images. *Journal of Retailing*, *85*(3), 376-390.

Lee, A., Aaker, J. (2004). Bringing the frame into focus: the influence of regulatory fit on processing fluency and persuasion. *Journal of Personality And Social Psychology*, *86*(2), 205.

Li, L., Masuda, T., Russell, M. (2015). Culture and decision-making: Investigating cultural variations in the East Asian and North American online decision-making processes. *Asian Journal of Social Psychology*, *18*(3), 183-191.

Liu, L., Li, C., Zhu, D. (2012). A new approach to testing nomological validity and its application to a second-order measurement model of trust. *Journal of the Association for Information Systems*, *13*(12), 950.

Lockwood, P., Marshall, T., Sadler, P. (2005). Promoting success or preventing failure: Cultural differences in motivation by positive and negative role models. *Personality and Social Psychology Bulletin*, *31*(3), 379-392.

Lüders, M., Andreassen, T. W., Clatworthy, S., Hillestad, T. (Eds.). (2017). *Innovating for Trust*. Edward Elgar Publishing.

MacKenzie, S., Lutz, R. (1989). An empirical examination of the structural antecedents of attitude toward the ad in an advertising pretesting context. *The Journal of Marketing*, 48-65.

MacInnis, D., Jaworski, B. (1989). Information processing from advertisements: Toward an integrative framework. *The Journal of Marketing*, 1-23.

Masínová, V., Svandová, Z. (2014, September). Factors Defining Satisfaction and Loyalty of the Online Shopping Customers Within e-Commerce and Cyber Entrepreneurship. In *European Conference on Innovation and Entrepreneurship* (p. 539). Academic Conferences International Limited.

Masuda, T., Nisbett, R. (2001). Attending holistically versus analytically: comparing the context sensitivity of Japanese and Americans. *Journal of Personality and Social Psychology*, *81*(5), 922.

Mitchell, A. (1981). "The Dimensions of Advertising Involvement", in NA - *Advances in Consumer Research* Volume 08, eds. Kent B. Monroe, Ann Abor, MI: Association for Consumer Research, Pages: 25-30.

Mirsch, T., Lehrer, C., Jung, R. (2017). Digital Nudging: Altering User Behavior in Digital Environments, in Leimeister, J.M., Brenner, W. (Hrsg.). Proceedings der 13. *Internationalen Tagung Wirtschaftsinformatik* (WI 2017), St. Gallen, S. 634-648

Moon, S., Bergey, P., Bove, L., Robinson, S. (2016). Message framing and individual traits in adopting innovative, sustainable products (ISPs): Evidence from biofuel adoption. *Journal of Business Research*, *69*(9), 3553-3560.

Muehling, D., Laczniak, R., Stoltman, J. (1991). The Moderating Effects of As Message Involvement: A Reassessment. *Journal of Advertising*. Vol XX, Number 2, June, 1991.

Nisbett, R., Norenzayan, A. (2002). Culture and cognition. In D. L. Medin (Ed.). Stevens' handbook of experimental psychology: Cognition (3rd ed., pp. 561–597). *New York: Wiley*.

Nisbett, R., Peng, K., Choi, I., Norenzayan, A. (2001). Culture and systems of thought: Holistic vs. analytic cognition. *Psychological Review*, 108, 291–310.

Nysveen, H., Kristensson, P. (2017). 22. Overcoming resistance to adopt innovations: softening innovation resistance through trusting beliefs. Innovating for Trust, 339. *Edward Elgar Publishing.*

Ouschan, L., Boldero, J., Kashima, Y., Wakimoto, R., Kashima, E. (2007). Regulatory Focus Strategies Scale: A measure of individual differences in the endorsement of regulatory strategies. *Asian Journal of Social Psychology, 10*(4), 243-457. http://dx.doi.org/10.1111/j.1467-839X.2007.00233.x

Patel, J. (2018). Bike Identification Project. *UT Challenge 2018*. Retrieved from UT Challenge's website on 15 June 2018: http://2018.utchallenge.nl/candidate/details/407

Petrova, P., Cialdini, R. (2005). Fluency of consumption imagery and the backfire effects of imagery appeals. *Journal of Consumer Research*, *32*(3), 442-452.

Thorbjørnsen, H. (2017). 24. Launching innovations. *Innovating for Trust*, 372.

Tsai, S. (2007). Message framing strategy for brand communication. *Journal of Advertising Research*, *47*(3), 364-377.

Tversky, A., Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211, 453-458.

Tversky, A., Kahneman, D. (1982). *The Simulation Heuristic*. In: Kahneman, D., Slovic, P., Tversky, A. (eds.) Judgment Under Uncertainty: Heuristics and Biases, pp. 201–208, *Cambridge University Press*, New York.

Reber, R., Schwarz, N., Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience?. *Personality and Social Psychology Review*, *8*(4), 364-382.

Riding, R., Cheema, I. (1991). Cognitive styles—an overview and integration. *Educational Psychology*, *11*(3-4), 193-215.

Rogers, E.M. (1995). Diffusion of Innovations. 4th ed., *New York: The Free Press*

Rothman, A., Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, 121, 3–19.

Schlosser, A., White, T., & Lloyd, S. (2006). Converting website visitors into buyers: how web site investment increases consumer trusting beliefs and online purchase intentions. *Journal of Marketing*, *70*(2), 133-148.

Schneider, D., Lins, S., Grupp, T., Benlian, A., Sunyaev, A. (2017). "Nudging Users Into Online Verification: The Case of Carsharing Platforms" *ICIS 2017* Proceedings. 11.

Schwarz, N. (2004). Metacognitive experiences in consumer judgment and decision making. *Journal of Consumer Psychology*, *14*(4), 332-348.

Scully, K. (2016). Top 10 neighbourhoods for bike theft in the Netherlands. IAMEXPAT. 02 December 2016. Retrieved on 24 July 2018, from the website of *iamexpat.nl*: https://www.iamexpat.nl/lifestyle/lifestyle-news/top-10-neighbourhoods-bike-theft-netherlands

Seckler, M., Heinz, S., Forde, S., Tuch, A., & Opwis, K. (2015). Trust and distrust on the web: User experiences and website characteristics. *Computers in Human Behavior*, *45*, 39-50.

Shah, J., Higgins, E. (1997). Expectancy× value effects: Regulatory focus as determinant of magnitude and direction. *Journal of Personality And Social Psychology*, *73*(3), 447.

Skard, S. (2017). 2. Trust and service innovation. Innovating for Trust, 17. *Edward Elgar Publishing.*

Smith, R., Chen, J., Yang X. (2008). "The Impact of Advertising Creativity on the Hierarchy of Effects," *Journal of Advertising*, 37 (4), 47–62.

Soh, H., Reid, L., King, K. (2009), "Measuring Trust in Advertising: Development and Validation of the Ad Trust Scale," *Journal of Advertising*, 38 (2), 83-103.

Song, H. (2009). The Effects of Processing Fluency on Judgment and Processing Style: Three Essays on Effort Prediction, Risk Perception, and Distortion Detection. *The University of Michigan.*

Thorbjørnsen, H. (2017). 24. Launching innovations. Innovating for Trust, 372. *Edward Elgar Publishing.*

United Nations. Classification and definition of regions. Retrieved from *United Nations*' website on 1 July 2018: https://esa.un.org/MigFlows/Definition%20of%20regions.pdf

Uskul, A., Sherman, D.., & Fitzgibbon, J. (2009). The cultural congruency effect: Culture, regulatory focus, and the effectiveness of gain-vs. loss-framed health messages. *Journal of Experimental Social Psychology*, *45*(3), 535-541.

Venkatesh, V., Morris, M. G., Davis, G., Davis, F. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Wang, A. (2006). Advertising engagement: A driver of message involvement on message effects. *Journal of Advertising Research*, *46*(4), 355-368.

Wang, J., Lee, A. (2006). The role of regulatory focus in preference construction. *Journal of Marketing Research*, *43*(1), 28-38.

Xiang, Z., Gretzel, U.,Fesenmaier, D. (2009). Semantic representation of tourism on the Internet. *Journal of Travel Research*, 47(4), 440–453.

Xue, F. (2015). Message framing and collectivistic appeal in green advertising—a study of Chinese consumers. *Journal of International Consumer Marketing*, *27*(2), 152-166.

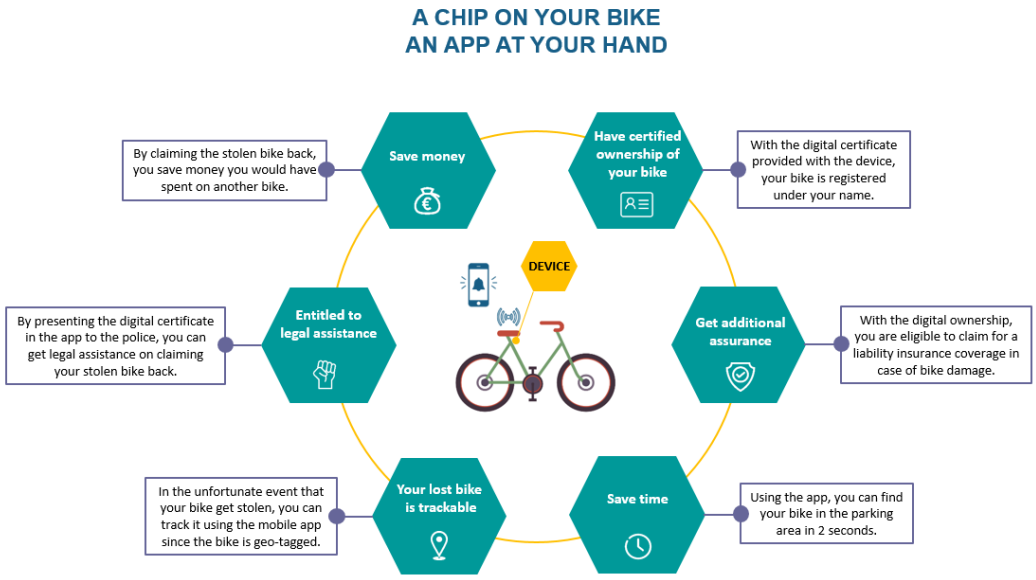
Yu, B., Roh, S. (2002). "The Effects of Menu Design on Information-Seeking Performance and User's Attitude on the World Wide Web." *Journal of the American Society for Information Science and Technology,* **53** (11): 923–933. doi:10.1002/asi.10117.

Zhang, M., Zhang, G., Gursoy, D., Fu, X. (2018). Message framing and regulatory focus effects on destination image formation. *Tourism Management*, *69*, 397-407.

# Appendix I Experimental Design Materials

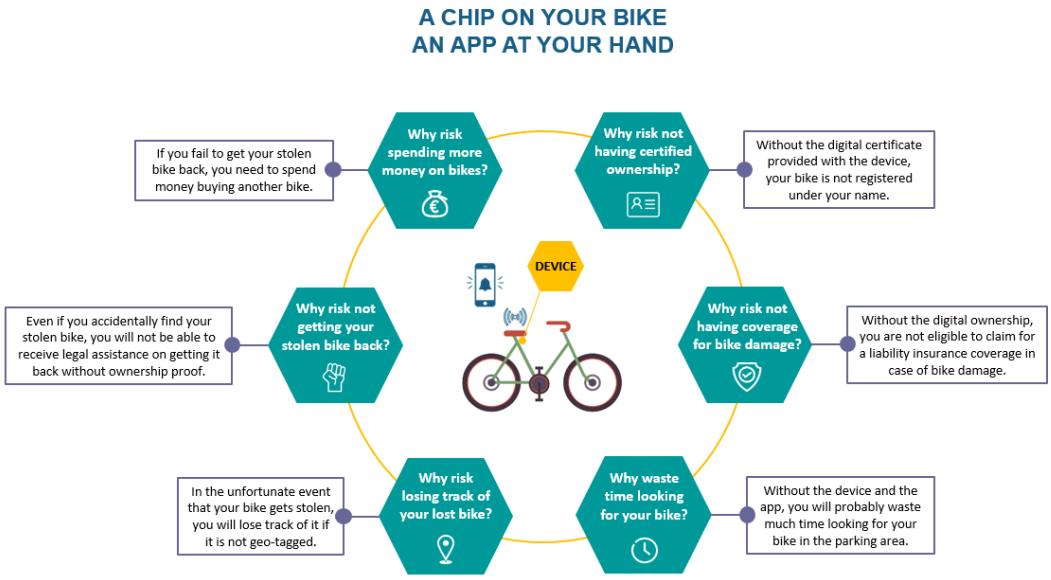
*A. Gain-Analytic condition*


*B. Gain-Holistic condition*



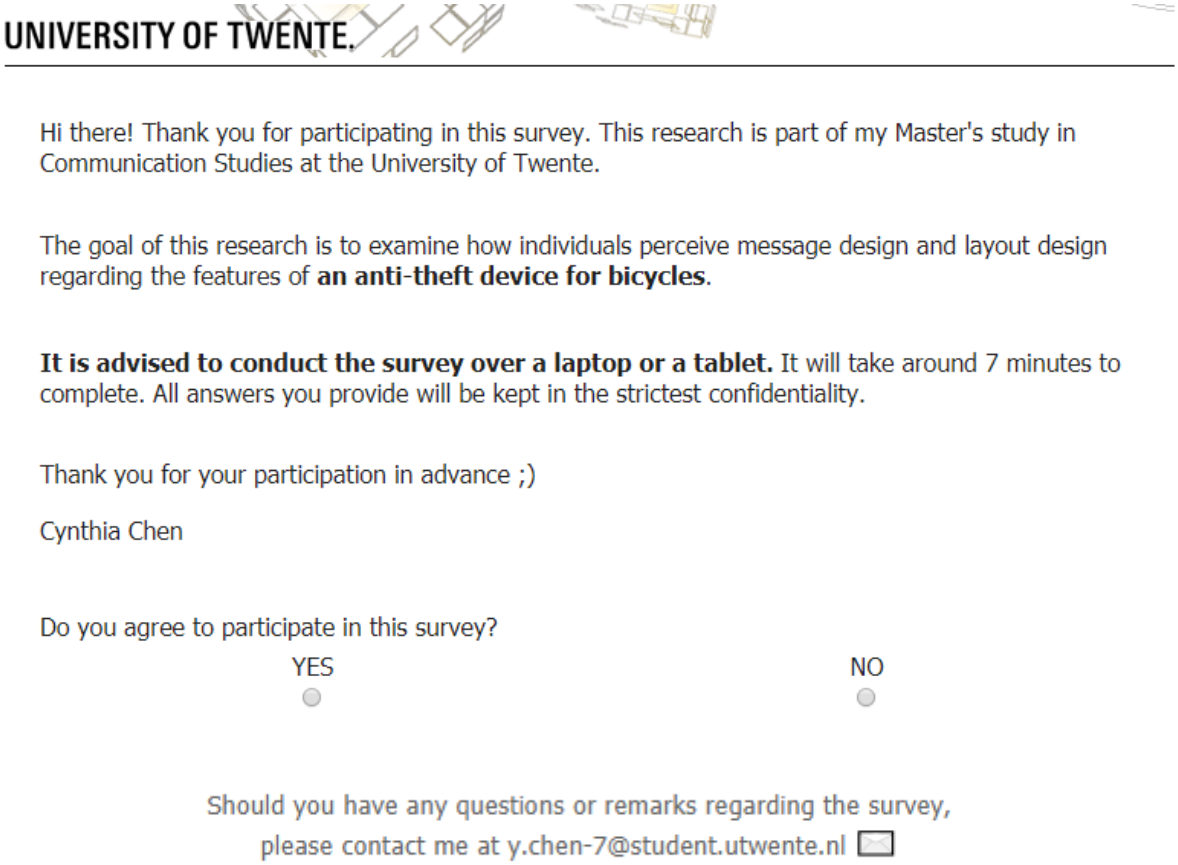
*C. Loss-Analytic condition*


*D. Loss-Holistic condition*



## Appendix II Questionnaire

*Welcome messages of the questionnaire*



UNIVERSITY OF TWENTE.

Hi there! Thank you for participating in this survey. This research is part of my Master's study in Communication Studies at the University of Twente.

The goal of this research is to examine how individuals perceive message design and layout design regarding the features of **an anti-theft device for bicycles**.

**It is advised to conduct the survey over a laptop or a tablet.** It will take around 7 minutes to complete. All answers you provide will be kept in the strictest confidentiality.

Thank you for your participation in advance ;)

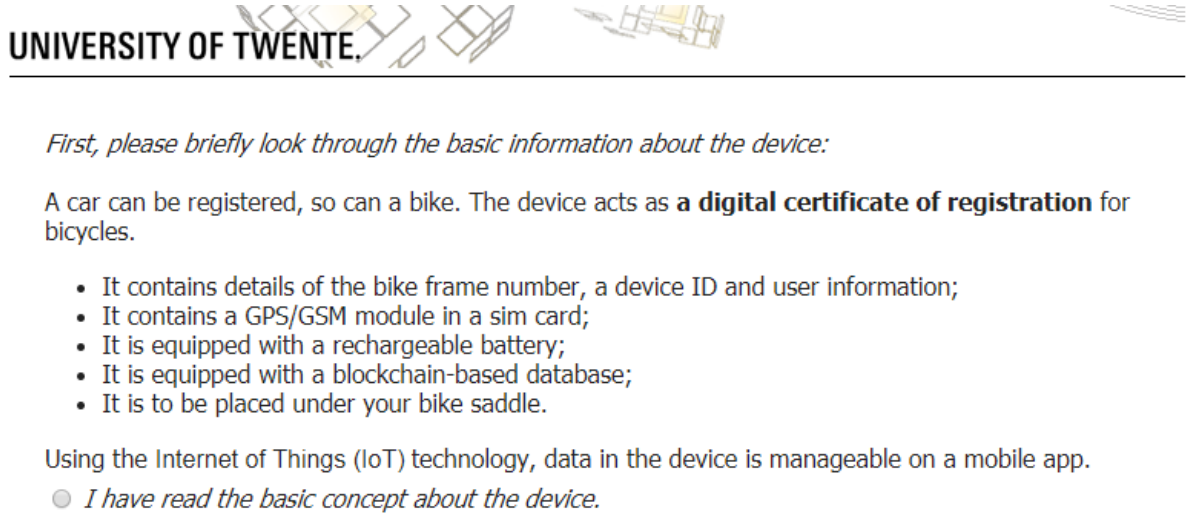
Cynthia Chen

Do you agree to participate in this survey?

YES ○ NO ○

Should you have any questions or remarks regarding the survey,
please contact me at y.chen-7@student.utwente.nl

*A briefing on the anti-theft device for bicycles*



UNIVERSITY OF TWENTE.

*First, please briefly look through the basic information about the device:*

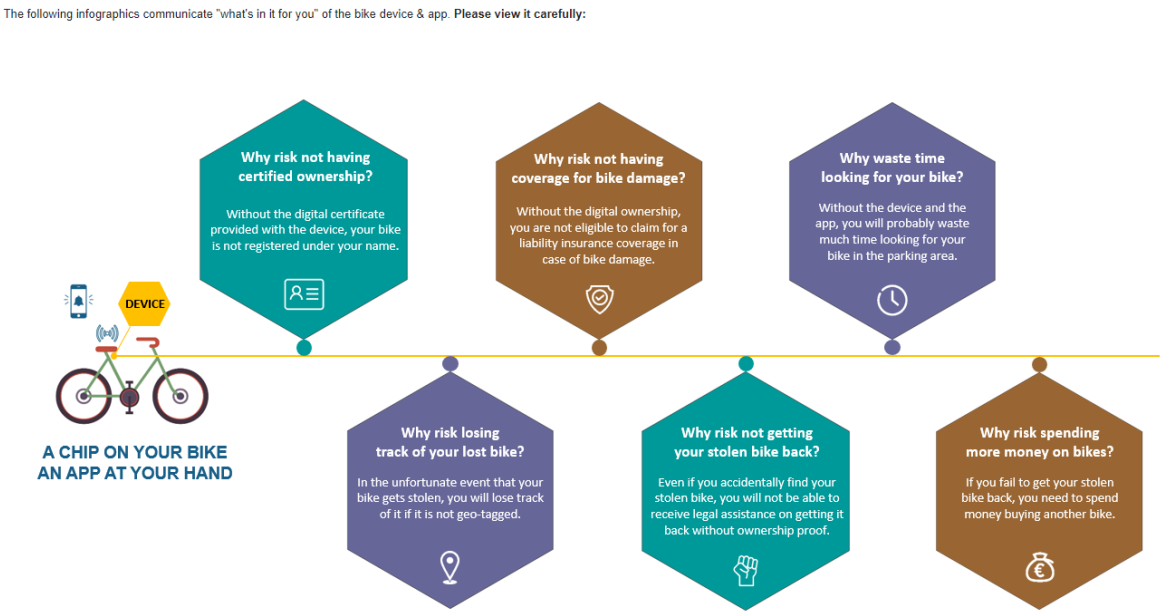
A car can be registered, so can a bike. The device acts as **a digital certificate of registration** for bicycles.

- It contains details of the bike frame number, a device ID and user information;
- It contains a GPS/GSM module in a sim card;
- It is equipped with a rechargeable battery;
- It is equipped with a blockchain-based database;
- It is to be placed under your bike saddle.

Using the Internet of Things (IoT) technology, data in the device is manageable on a mobile app.

○ *I have read the basic concept about the device.*

*A presentation of the infographics (one out of the four conditions, which are included in Appendix I):*




*Questions on Message Comprehension (first three) and Navigation Convenience (last three):*

*Please give your opinion on the following items:*

| |
|---|
| The claims made in the infographics were easy to understand. |
| I was able to comprehend the claims. |
| The claims were hard to understand. |
| It is easy to find what you are looking for in this infographics. |
| It is easy to navigate around this infographics. |
| The infographics are well organized. |

*Questions on Perceived Information Value (first four) and Aesthetic Appeal (last three):*

*Please give your opinion on the following items:*

| |
|---|
| The information offered is valuable. |
| The information offered is good. |
| The information offered is useful. |
| The information offered helps me reconsider the security of my bike. |
| I like the look and feel of this layout design. |
| I like the images used in this layout. |
| This layout design makes the concept of the bike device look very appealing. |

*Questions on Ad Message Involvement*

*Please give your opinion on the following items:*

| |
|---|
| I gave the information a lot of consideration. |
| I thought about my own experience with bike use when I looked at the information. |
| The information stimulated my imagination. |
| I was able to imagine using the bike device. |

*Questions on Willingness to try*

*The following questions are about your willingness to try the device after seeing the features of the device*.*

**You do not need to worry about installation and cost.*

| |
|---|
| I am willing to consider the information conveyed in the infographics when making the decision to try the bike device. |
| I am willing to rely on the information conveyed in the infographics when making the decision to try the bike device. |
| I am willing to try the bike device based on the information conveyed in the infographics. |
| I am willing to recommend the bike device that I have seen in the infographics to friends of mine who are concerned about securing their bikes. |

*Opinions on each above item are measured by 5-point Likert scales (Disagree – Agree):*

| Disagree | Moderately Disagree | Neutral | Moderately Agree | Agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |
| ○ | ○ | ○ | ○ | ○ |
| ○ | ○ | ○ | ○ | ○ |
| ○ | ○ | ○ | ○ | ○ |
| ○ | ○ | ○ | ○ | ○ |
| ○ | ○ | ○ | ○ | ○ |

*Demographic-related questions:*

UNIVERSITY OF TWENTE.

What is your gender?

- Male
- Female
- Other

What is your age?

What is the highest education level you have attained? (If you are a student, please select the degree you are currently pursuing)

- High School
- Vocational training
- Bachelor
- Master
- PhD
- Others

What is your major area of study?

- Social Sciences (Including Business Studies)
- STEM (Science, Technology, Engineering, Mathematics)
- Arts, Design, Humanities
- Others

What is your nationality?

To the nearest year, how long have you been lived in the Netherlands?

- I have never lived in the Netherlands.
- Less than 2 years
- Between 2 and 5 years
- More than 5 years
- For most of my life / my whole life.

Have you ever had experience losing your bike?

- Yes
- No