Ambiguity and novelty-seeking in tourism

Master's Thesis

Behavioral Economics

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Abstract. Travel-related decisions are often made under ambiguities. This study investigates the influence of ambiguity attitudes, age and travelling experience on preference of novelty-seeking in tourism. An online survey was conducted to collect the data of the research. Results demonstrate that the ambiguity aversion measured in an Ellsberg urn-like experiment does not affect people's preference for novelty-seeking. Similar to findings in prior literature, age has a significant negative effect on the level of novelty-seeking. In addition, a positive relationship has been found between long-distance travel experience and novelty-seeking preference.

Key words: Ambiguity attitude, Ambiguity Aversion, Novelty-seeking, Perceived risk

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1. Introduction

The tourism industry has been growing steadily in recent decades; thus, it is essential to gain a better understanding of tourists' behaviors and preferences for all stakeholders. Some enjoy having their vacation in a familiar place and relaxing, while others prefer visiting places entirely different from their familiar home surroundings and engaging in new, exciting activities. Psychological characteristics, such as novelty seeking, have often been employed to explain tourists' behavior. The theory of disequilibrium and optimal level of stimulation has been proposed to help explain the novelty preference in numerous studies (Berlyne, 1960; Hebb and Thompson, 1954). The main premise is that people leave their home to visit novel places, because they are experiencing a stimulation deficit and, thus, have a desire to experience something new and different. On the other hand, stimulation overload leads to people selecting a more familiar environment in which to travel.

Leisure travel, as a product, generally involves some feelings of uncertainty and intransparency, because the return is intangible and there is always some ambiguity in related decisions. The decision-making process under these uncertainties involves a combination of risks and ambiguities. Therefore, most of the time, it is difficult to adequately predict the likelihood of events, and individuals are often confronted with ambiguity because the exact probability is not available.

Ambiguity in tourism is generally derived from whether the travel product or activities meet the overall expectations of the tourists. It is also highly correlated to numerous decision-making processes related to travel, with examples as diverse as choice of destination, travel routine, willingness to try new food, and participating in new and exciting activities. Compared to daily life, people are more likely to encounter ambiguity while they are traveling. The reason for this is that, compared to their home, tourists are usually unfamiliar with the travel environment such as dealing with a different language and culture, local public transportation, diverse culinary encounters and experiencing unique activities. In the process of making decisions, there are not only objectives and quantitative risks to consider, but also beliefs, which in terms of subjective probability concerning an ambiguous event may influence the tourists' choices (Cater, 2006).

Lee and Crompton (1992) explained novelty-seeking in tourism as a multi-dimensional construct and, therefore, developed a 21-item instrument comprising four dimensions. The measuring of novelty-seeking has been employed for cross-cultural applications (Jeong and Park, 1996), understanding the destination choice (Ariffin, 2008), segmenting the tourist

market (Chang and Chiang, 2006; Weaver, 2009), and analyzing satisfaction and loyalty (Toyama and Yamada, 2012). Many studies suggest that if the level of novelty meets or exceeds the expectations of novelty seekers, they will be satisfied. Meanwhile, novelty also has a positive effect on revisit intentions, which are vital for the tourism market since these intentions can significantly increase profits and lead to positive word-of-mouth (Toyama and Yamada, 2012).

Although the importance and influences of novelty-seeking have been widely evaluated and investigated, little is known about its possible causes or other preference traits that tend to correlate with novelty-seeking behaviors. Consumers seek an optimal level of stimulation which heavily influences their decision-making process. If we know what factors are related to tourists' novelty-seeking preferences, better travel products can be provided, so as to better satisfy their wants, needs, and desires. On the other hand, tourists may also have an idea of balancing that which is familiar with a mixture of novelty according to their traits or characteristics when they are still in their vacation planning stages.

The purpose of this study is to investigate the correlations between novelty-seeking levels and ambiguity attitudes. Other factors related to novelty-seeking are also examined such as age and remote travel experiences. In this study, the 21-item instrument introduced by Lee and Crompton (1992) was utilized to obtain a profile for novelty-seeking. Moreover, the matching probability method was employed to measure individuals' ambiguity attitudes. In Chapter 2, literature regarding novelty and ambiguity is briefly reviewed followed by the hypotheses concerning expected relationships. In Chapter 3, the theoretical basis for the underlying measurement of ambiguity attitudes is presented with the descriptions of the novelty-seeking instrument. Next, the data of the study are described and the hypotheses are carefully examined through the regression analysis conducted in Chapter 4, while Chapter 5 provides various insights and implications. Meanwhile, the limitations and recommendations for further research are discussed and, lastly, Chapter 6 presents the conclusions of the study.

2. Literature Review
2.1 Ambiguity

Numerous real-life decisions are made under a variety of uncertainties, and sometimes no probabilities are available. Thus, Knight (1921) distinguished between measurable and unmeasurable uncertainties. To be more specific, risk or measurable uncertainty can be expressed by means of numerical probabilities, while unmeasurable uncertainty cannot. Inspired by Knight, Ramsey (1926) proposed that subjective beliefs can be defined by analyzing the choices. For example, in a betting game, if the full belief is denoted by 1, the opposite of full belief is 0, while two equal beliefs are a ½. The subjective expected utility theory was developed based on Ramsey's theory which states that people tend to attach subjective probabilities to diverse events and then use the expected utility to evaluate prospects (Savage, 1954). In this case, when there exists no available probability, people retain their subjective probability in their minds or rationalize the probability.

Ellsberg (1961) proffered that the theories from Ramsay and Savage do not adequately describe the choice for unmeasurable uncertainties. To be more specific, those uncertainties are not able to reduce to risks or quantitative probabilities. To overcome this difficulty, he introduced the concept of ambiguity by designing an experiment which involved two urns with either black or red balls totaling 100 balls. One urn contained 50 red and 50 black balls, whereas the color distribution was unknown for the other urn. Next, the decision maker was asked to bet on one urn and could win money if a ball randomly drawn from the urn was red. Since the two colors were equally divided, the winning probability for the known or risky urn was 0.5; however, the probability related to the ambiguous urn was anywhere between 0 and 1 and depended on the subjective probability. The result of the experiment demonstrates that people would rather choose to bet on the urn with a known probability than the one with an unknown probability. Meanwhile, the preference for the known urn was established as being independent of the color. The events of a red ball and black ball drawn from the known box K were denoted as R_k and B_k, respectively. Similarly, the events of a red and black ball drawn from the unknown box U were R_u and B_u, respectively. Since the known box is preferred by subjects it implies that $P(R_k) > P(R_u)$ and $P(B_k) > P(B_u)$;

thus, $P(R_k) + P(B_k) > P(R_u) + P(B_u)$ Since the sum of the probabilities of mutually exclusive and exhaustive events is one which yields a contradiction.

Widespread ambiguity aversion has been studied through a variety of different domains. Except in games of chance, decision makers usually do not know the precise probabilities of

the various outcome; thus, it is common for them to face ambiguity. MacCrimmon (1968) examined the ambiguity aversion effects on 35 business executives in relation to an investment decision. Nearly half of them opted to invest in countries with historical frequencies (risky) instead of countries without historical frequencies (uncertainty), which reflects ambiguity aversion. Moreover, ambiguity aversion has been found in the context of insurance and medical decisions (Machina and Siniscalchi, 2014).

Nevertheless, this kind of behavior is inconsistent with the expected utility theory. The same experiment was examined by Becker and Brownson (1964) who discovered that most subjects demonstrated a strict preference for the risky urn even at the cost of expected value and the amount they paid to avoid ambiguity was called *ambiguity premium*. Subjects who preferred the risky urn to the ambiguous urn in Ellsberg-type setting gamble were *ambiguity averse*. Contrariwise, subjects who preferred the ambiguous box to the risky urn were *ambiguity seeking*. If the subjects demonstrated an indifference to the two urns, they were defined as *ambiguity neutral* and their choice reflected the expected utility theory.

A general definition of ambiguity was proposed by Frisch and Baron (1988) as an uncertainty about probability created by missing information that is relevant and salient. Besides ambiguity related to probability, missing source credibility and weights of evidence are also causes of ambiguity (Camener and Weber, 1992). Meanwhile, the missing information could be found in different forms such as having a lack of knowledge of football, politics or new technology, and having doubts about which expert is right or being unsure with regard to the economy of a foreign country.

However, when it comes to the real world, the Ellsberg urns problem seems much too simplified, because the source preference and subjective belief are assumed to be constant in this case. In addition, it is suggested that people generally prefer risky options over uncertainty, at least for moderate probability (Heath and Tversky, 1991). Compared with natural sources of uncertainty, an artificial symmetric design such as an Ellsberg-type question has an advantage in controlling beliefs. People felt incompetent with regard to the unknown urn because they had no additional information or knowledge upon which to rely. Moreover, people's beliefs about events also influence their willingness to bet on ambiguous events. A subjective belief exists because instead of likelihoods, people's knowledge also plays a decisive role in decision-making under uncertainty. Heath and Tversky (1991) posited that people prefer to bet on events in which they have some expertise, even if it is more ambiguous than other options. In the study of household portfolio choices, Dimmock et al. (2016) ascertained that domain-specific knowledge played a role in ambiguity aversion toward stock investment. Instead of betting on

chance, people were more willing to bet in areas of ambiguity where they felt more confident (Fox and Tuersky, 1995). For example, an economist may show a strong preference to bet on the Dow Jones market over a risky event, because he/she may have more confidence in aspects of uncertainty.

Trautman and Kuilen (2015) shared a similar view and interpreted ambiguity aversion as one case of source preference. However, in reality, individuals' choices cannot fully reflect their preference for known and unknown probabilities, but rather a preference for source uncertainty regarding information in which they are more familiar (Trautman and Kuilen, 2015). For example, American investors may prefer the Dow Jones to the AEX, while Dutch investors may prefer the opposite. This phenomenon is often related to a familiarity bias, which posits that people tend to pick the most familiar gamble.

The reason for ambiguity aversion can be explained from a genetic perspective, as researchers have found that there are distinct neuro-genetic mechanisms regulating ambiguity aversion and familiarity bias (Chew et al., 2012). Besides, it is also related to various social factors which suggest that ambiguity aversion may increase in relation to fear of criticism by others if the choice results in a negative outcome (Trautmann et al., 2008).

2.2 Novelty-seeking in tourism

Cooper (2003) had a comprehensive interpretation of tourists' demands which states that tourists' attitudes, perceptions, and motivation jointly influence their travel decisions. More specifically, attitudes are dependent upon innate tendencies and personalities, whereas perceptions are mental impressions from tourists' own experiences and other source influences. Finally, it is primarily motivations that initiate travel behavior and these motivations are also the driving force behind all tourism activities (Fodness, 1994). According to Cooper (2003), travel motivation represents an inner urge which occurs because of an innate need for tension-reducing and arousal-seeking. This opinion was inspired by Maslow's hierarchy of need. Based on Maslow's model, once the lower level need is satisfied, the next hierarchy of needs would dominate people's behavior. In this case, once the lower level needs are satisfied, people's demands tend to move from materialistic aspects to the more spiritual aspects and travel can fulfill this need from a higher level. However, the view of inner urge and Maslow's model is not sufficient for elaborating on all travel behaviors. Crompton (1979) described novelty as a pull factor in the choice of travel destinations.

From previous studies, researchers maintain the opinion that people's desire for novelty is the centrality in leisure trip choices. The general definition of novelty is the contrast between present perception and experience (Pearson, 1970). This simply means that people compare the stimulus of the present with the stimulus they have encountered at some point in their past. The higher the stimulus contradiction, the more novelty is produced. Moreover, it is quite natural for human beings to have an intrinsic motivation to explore a new and unfamiliar environment. This can be explained by both neuroscience and from a psychological perspective. On the one hand, novelty-seeking behavior is determined by the level of the activity from the neurotransmitter dopamine (Cloninger, 1994), while, on the other hand, it is related to human survival skills (Winifred Gallagher, 2011). In this case, people's various levels of desire for novelty can be explained by their need to explore new resources and avoid risks.

By relating to the main driving force of leisure trips, it is easy to understand why novelty-seeking plays such an important role in studying tourists' behavior. The key motivation for people to travel is that they have an innate desire to see and experience something new in order to fulfill their needs (Crompton, 1979; Pearce, 1988). Hebb and Thompson (1954) developed the theory of optimum level of stimulation, which states that individuals have certain levels of optimal stimulation. They tend to restore their optimal degree of stimulation by increasing or decreasing novelty or other stimulation. This theory is in line with the major reasons for novelty-seeking, which related to the abatement of boredom and the psychological need to solve an unknown task (Berlyne, 1960).

To assess the preference of novelty-seeking in the context of tourism, a 21-item instrument with four dimensions was introduced by Lee and Crompton (1992). The scale is well-constructed because it was judged to have content validity and the various dimensions were internally consistent. Weaver et al. (2009) used the instrument to segment the leisure travel market based on the novelty preferences; thus, three novelty clusters were identified: thrill seekers, change seekers and homebodies. They discovered that the thrill seekers, who desired the highest level of novelty among the clusters, were younger and more likely to plan their travel activities. Moreover, the cluster with the highest level of novelty preference consisted of more travel knowledge and a stronger willingness to take international trips. The same instrument was used by Chang and Chiang (2006) for distinctive international tourists and found repeat visitors tended to score high on novelty.

Nevertheless, novelty in tourism does not always contrast familiarity, because tourists can also have a sense of novelty concerning their familiar destinations. Feng and Jang (2007) proffered that novelty-seeking is positively correlated to the intention to revisit. One main

reason for this correlation is that novelty influences satisfaction. Furthermore, Toyama and Yamada (2012) examined the relationship among novelty, familiarity and tourists' loyalty. They found that familiarity generates a sense of security which contributes to loyalty. In tourism, the role of familiarity, as it relates to destination loyalty, is often relative to the desire to reduce the risk of a bad experience (Gitelson and Crompton, 1984). They also discovered that novelty has a direct effect on the formation of satisfaction. Therefore, the satisfaction which is brought by novelty can also lead to exhibiting loyalty to a travel destination.

There are also diverse opinions relating to the stationarity of novelty-seeking. Some researchers consider novelty-seeking as one dimension of personality (Cloninger, 1987) which can be considered as a stable trait. However, other researchers posit that novelty is also a changing or evolving process which can be learned or progresses with experience (Prichniak, 2014). It has also been discovered that the tendency of novelty-seeking is influenced by culture and life stages. By some estimates, the urge for novelty drops by half between the ages of 20 and 60 (Tierney, 2012); various other studies have also discovered the same trend. Weaver et al. (2009) proposed the use of novelty-seeking to segment the tourism market. Based on demographic information, they found that the most novelty-seeking cluster was the youngest among all clusters. Meanwhile, the least novelty-seeking cluster was the oldest cluster. Those findings indicate that there might be a trend that people become less novelty-seeking as they increase in age.

2.3. Ambiguity and Novelty-seeking

Relative to Ambiguity Attitude, *Tolerance and Intolerance Ambiguity (TIA)* is a frequently used notion, especially in psychology, which is derived from subjective perceptions (Budner, 1962). For example, *Ambiguity tolerance* means the tendency to perceive ambiguous situations as being desirable. On the contrary, *Ambiguity Intolerance* means the tendency to perceive ambiguous situations as sources of threats. There are three subscales in the TIA scale, namely, novelty, complexity, and insolubility (Budner, 1962). Four out of a total sixteen questions were presented in the novelty part of the scale, such as "Would you like to live in a foreign country?" and "What we are used to is always preferable to what is familiar." These novelty items have been used as one of the sources of ambiguity which can be interpreted as people encountering ambiguity in novelty situations. Moreover, it appears that there are some overlapping parts between ambiguity and novelty. In this case, a relationship is highly likely to exist between novelty-seeking and ambiguity seeking.

Rajagopal and Hamouz (2009) conducted a survey using new or unfamiliar food as a source of ambiguity and found that the TIA score reflects a significant positive relationship with both the willingness to try and novelty-seeking. They posited that the degree of ambiguity tolerance can be measured by attitudes and behavioral patterns towards new food. In addition, people's novelty-seeking behaviors concerning food are consistent with behaviors in general novel situations as well as their willingness to seek exciting experiences, according to Otis (1984). Due to this consistency, it can be inferred that novelty-seeking behaviors in other circumstances, such as travel, may correlate to ambiguity attitudes.

The relationship between novelty-seeking and risk-related cognitive processes was also examined by Wang et al. (2015). They investigated brain activation and suggested that higher novelty-seeking may be associated with less aversion to risk. Although the brain functions differently with risks and ambiguity (Krain et al., 2006), the finding can be used as an appropriate analogy, because both risk and ambiguity relate to uncertainty.

Furthermore, perceived risk is treated as a latent variable comprising multiple dimensions (Correia et al., 2008), and the correlation between perceived risks and novelty preference in tourism has been investigated by Lepp and Gibson (2003). The results of their study support their hypothesis that novelty seekers perceive less risk than familiarity seekers. Liu and Gao (2008) described tourism risk perception as a process of evaluating uncertain events. The term "perceived risk" involves several risky factors such as cultural barriers, terrorism, and political instability. These factors represent obvious possible threats to tourists' well-being, yet the exact probabilities of the events are unknown to the tourists. Moreover, less perceived risk is not equivalent to less ambiguity aversion, but they do have much in common: for instance, an optimistic belief concerning uncertain events. Based on those inferences it seems that ambiguity attitudes can also be related to the novelty-seeking preferences of tourists.

2.4. Hypotheses

Weaver et al. (2009) employed the 21-items instrument to measure the novelty-seeking preference in leisure trips from a sample of 2000 American residents. The results demonstrated that there is a negative trend between age and novelty-seeking behavior, which suggests that younger individuals are more novelty-seeking compared to their older groups. Therefore, the first hypothesis is developed as:

H1: Age is negatively related to the level of novelty-seeking in leisure travel

Although previous research has been conducted on the relationship between risk and

novelty-seeking, there are limited literary resources focusing on ambiguity and novelty-seeking. In tourism, instead of ambiguity, risk or perceived risk is often used which indicates a general uncertain negative effect on tourists' utilities. These two concepts are dissimilar, because perceived risk refers to the probabilities of negative effects, whereas the consequence of ambiguous events could be either good or bad and associated with unknown chances. However, when comparing ambiguity and perceived risk there are some areas where those two concepts are found to be associated. First, both terms involve uncertain probabilities. Second, they are both influenced by subjects' experience or knowledge when related to a specific event. The study on perceived risk suggests that a negative correlation has been found between risk perception and novelty-seeking levels in leisure travel (Lepp and Gibson, 2003). Thus, Hypothesis 2 is formed by learning from the previous findings:

H2: Ambiguity aversion is negatively related to the level of novelty-seeking in leisure travel

Previous hypotheses assumed that both age and ambiguity have effects on the level of novelty-seeking. Thus, it is plausible that age and ambiguity jointly produce an interaction effect on ambiguity. In this case, the effect of age differs for diverse values or levels of ambiguity aversion. The negative effect between age and novelty-seeking might also be weakened by ambiguity seeking. The following hypothesis was added so as to further explore the relationship between novelty-seeking and age with the effects of ambiguity aversion.

H3: An interaction effect exists between the novelty-seeking level and age with ambiguity aversion

The choice of activities and destinations is also affected by the amount of previous experience (Lehto, O'Leary and Morrison, 2004). Experienced tourists perceive fewer risks compared to their counterparts; thus, the perceived risk can be related to novelty (Lepp and Gibson, 2003). Meanwhile, tourists with more experience have a desire to satisfy certain higher order needs (Pearce, 1988). For those people, besides the extension and intensification of daily life, touristic experience should be in contrast to daily experiences to some extent. Therefore, it seems reasonable to assume that the richness of experience in inter-continental or long-distance travel has some effect on their perceived risk, which tends to influence novelty-seeking preferences. Therefore, the fourth hypothesis is proposed as:

H4: Having a long-distance travel experience has a positive effect on the level of novelty-seeking in leisure travel

3. Methodology

3.1 Ambiguity attitude measurement

Ambiguity attitude will be elicited by applying the matching probabilities method introduced in Dimmock, Kouwenberg and Wakker (2016). This method was selected because it has been proved that this method can adequately measure ambiguity attitudes without knowing the utility or probability weighting function. In addition, the design of the two boxes has the advantage of controlling subjects' beliefs as compared to natural events. The reason for this is that individuals cannot apply their domain-specific knowledge while betting. For this method, subjects were presented with two boxes, an ambiguous box U and an unambiguous box K, both containing 100 balls that were either red or black. There were initially 50 black and 50 red balls in the unambiguous box, whereas the color distribution of the balls was unknown for the ambiguous box. Therefore, the number of red balls for the subject could be any number from 0 to 100 depending on his/her subjective probability. The subject was able to bet on one box and an indifference option was also made available if he/she thought that the two boxes were equally attractive to him/her. The subject would win only if the ball randomly drawn from the box was red.

Definition 1: *Matching probability* m is the proportion of the winning color (red) balls that makes the subject indifferent in selecting between the ambiguous and unambiguous box.

The matching probability equals the number of red balls divided by the total of 100 balls.

That is: $m = x/100$

If $m = 0.25$, it infers that the subject is indifferent between choosing the unambiguous box (with a winning probability of 0.25) and the ambiguous box.

The ambiguity attitude of an individual is captured by employing matching probabilities with a bisection approach (Dimmock, Kouwenberg, &Wakker, 2016), which starts with the initial known probability of winning and decreases or increases the probability according to the subject's choice. Monotonicity is assumed here and this part will be terminated once subjects choose an indifferent option.

Definition 2: *Ambiguity aversion index* (AA index) is: $2*(0.5-m)$

For an ambiguity neutral subject, the winning probability of the two boxes is the same which means his/her subjective probability is 0.5 in this case. Therefore, the matching probability of an ambiguity averse individual should be below 0.5, and for an ambiguity seeking individual, it is above 0.5.

The ambiguity attitude is measured by the ambiguity aversion index which ranges from -1 to 1. It first compares the individual's matching probability with the ambiguity neutral probability of 0.5 and then multiplies the difference with 2. A negative AA index implies that the subject is ambiguity seeking. However, the AA index for an ambiguity averse subject is positive, since the subjective probability is always smaller than the neutral probability. Meanwhile, the higher the value, the more ambiguity averse the person. The AA index equals zero if the subject is ambiguity neutral.

3.2 Survey design

The data of the study were collected by utilizing an anonymous self-administered questionnaire. There were three sections in the online survey.

The first part included demographic variables such as age, gender, nationality, educational level, occupation, and family composition (Cooper et al., 2007) as well as past travel questions such as travel expenditure, travel companions, duration, frequency, primary purpose of leisure travel, and number of past long-distance travels. The travel information above was of interest because one prevailing definition of novelty in travel considered it as the contrast degree between present choices and experience (Judd, 1988; Pearson, 1970). Furthermore, long-distance travels refer to leisure trips which exceed 1500km. Instead of the number of countries visited, the experience of being far away was asked because crossing geographical borders does not always imply exotic magnificence.

The ambiguity attitude of an individual was elicited in the second section where Ellsberg-type questions were presented to the subject. The initial test setup had 50 red and 50 black balls in the risk box (K) and unknown distribution for ambiguous box (U). The winning color of the ball was defined as red because, in Ellsberg's experiment, people were indifferent when betting on two colors; thus, being able to choose a winning color did not affect their preference. If the subject preferred the risky box during the first round, the number of red balls was halved to 25 to make it less attractive. This action was repeated until the indifferent approach was selected and a maximum of four rounds was allowed (see Figure1). The same method also applied if the subject selected the ambiguous box U in the first round. In this case, the unambiguous box becomes more attractive, while the ambiguous box remains the same. Thus, if the ambiguous box U is always chosen, the number of red balls will increase to 75, 87 and 93 in the second, third and fourth rounds, respectively.

Figure 1. The workflow of Ambiguity attitude measurement
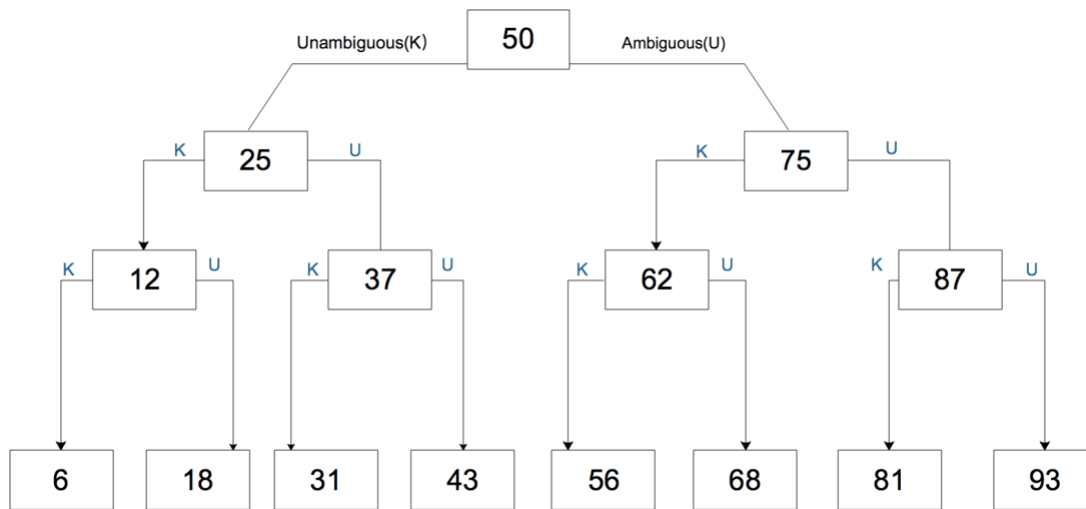
Novelty-seeking is an inter-disciplinary concept, which is commonly employed to study both psychology and consumer behavior. As a willingness to try something new, Hirschman (1984) viewed it as being analogous to inherent innovativeness. Moreover, people's preference for novelty-seeking is domain-specific; thus, it could be quite different when it is related to diverse backgrounds. A 21-item instrument was applied in this study (see Table 1) because it was developed with the purpose of assessing novelty in the context of tourism (Lee and Crompton, 1992). Four overlapping dimensions were provided in the novelty-seeking measurement, namely, ''thrill'', ''change from routine,'' ''boredom alleviation,'' and ''surprise''. Furthermore, there were three to five sub-questions under each dimension allowing the subjects to provide more accurate self-ratings, because the sub-questions provided detailed descriptions which corresponded to the dimension. Moreover, the subjects could report their ratings on a 5-point Likert-scale, which included the following options: strongly agree; agree; no opinion; disagree; and strongly disagree.

Table 1. The 21-item novelty-seeking measurement in tourism

Factor1: Thrill
I sometimes like to do things on vacation that are a little frightening.
I enjoy doing ''daring'' activities while on vacation.
Sometimes it is fun to be a little scared on vacation.
I enjoy experiencing a sense of danger on a vacation trip.

I would like to be on a raft in the middle of a wild river at the time of the spring floodwaters.

I enjoy activities that offer thrills

I seek adventure on my vacation.

Factor2: Change from Routine

I like to find myself at destinations where I can explore new things.

I want to experience new and different things on my vacation

On vacation, I want to experience customs and cultures different from those in my own environment.

On vacation, I enjoy the change of environment which allows me to experience something new.

My ideal vacation involves looking at things I have not seen before.

I want there to be a sense of discovery involved as part of my vacation.

I like to travel to adventurous places.

I feel a powerful urge to explore the unknown on vacation.

Factor3: Boredom Alleviation

I want to travel to relieve boredom.

I have to go on vacation from time to time to avoid getting into a rut.

I like to travel because the same routine work bores me.

Factor4: Surprise

I don't like to plan a vacation trip in detail because it takes away some of the unexpectedness.

I like vacations that are unpredictable.

I would like to take off on a trip with no pre-planned routes in my mind.

3.3 Incentives

Each participant had an equal opportunity to receive one of two €25 cash rewards. This information was made available on the first page of the survey, and the money was dispensed by the experimenter one month after collecting the results.

In the second block of the survey, instead of real incentives, hypothetical choices were applied in betting between the two boxes, since real incentives are not always necessary. According to the capital-labor-production framework, paying money becomes useless if the task is too easy since the participants are already playing at an optimal level. Most of the questions were intuitive and did not require much cognitive effort to report their true preferences.

In the survey, the participants' choices were irrelevant to the probability of receiving the €25 cash reward. Furthermore, the random lottery incentive mechanism was not applied because of problems related to hedging. This is because the random incentive system is not incentive compatible if the subject is ambiguity averse, as it provides a randomization device for subjects to hedge their ambiguity; hence, their choices may not reflect their actual preferences (Baillon, Halevy and Li, 2015). Meanwhile, since only two participants were eligible for the cash reward, the random lottery incentive may decrease the incentive compared to a less significantly random lottery incentive. This is because if the random incentive method was applied, the subject's payment would be dependent upon not only being chosen at random, but also winning when betting on the boxes. Therefore, the participants may feel that the probability of winning the reward is too low, especially since an extra fraction would be lower than the original probability of winning in the random incentive system. However, this problem could be overcome, if everyone could receive payment during one round and the randomization took place prior to when the decision was made.

4. Results

In this section, the statistical data from the survey are presented first, followed by correlation tests to prove the hypotheses. Next, single and multiple linear regressions were performed with OLS so as to examine the relationships between the level of novelty-seeking and several explanatory variables.

4.1 Description of data

The data utilized for the study were collected by means of an online survey via social media that offered an anonymous link. The online survey was web-based and mobile-friendly consisting of an English and Chinese version. Out of the 108 respondents who took the survey, 83 completed the entire survey; thus, the data from the fully completed surveys (n=83) were analyzed.

Table 3 presents the summary statistics. Of those who completed the survey, 55% were Chinese residents, 32% were Dutch, and 13% were residents of other countries. The ages of the participants ranged from 19 to 67 with a mean of 32.91 and a median of 27. The data related to age were not widely spread out as the interquartile range was 19. With regard to the results of the highest educational level, it suggests that most of the respondents have a bachelor's (43.37%) or master's degree (42.17%).

As regarding the type of travel, 22% of the respondents mostly travel alone. Furthermore, the number of long-distance travels was grouped into six categories from 'never had' to 'more than 20 times'. Six respondents (7.23%) never experienced long-distance leisure travel, while 36.14% of the respondents had 1 to 5 long-distance travel experiences which represent the category with the largest number. More than half of the subjects experienced more than five long-distance travels.

The mean and median of the ambiguity aversion index were 0.18 and 0, respectively. The minimum was -0.8 and the maximum 0.94. Only 22.89% of the respondents exhibited a negative ambiguity aversion index (AA Index), which indicates they are ambiguity seeking. As many as 49.4% were ambiguity averse, since they registered a positive value in the ambiguity aversion index. The remaining 27.72% of the respondents were ambiguity neutral, because they had zero for the AA Index which indicates they are indifferent in choosing between the risky and ambiguous boxes.

Moreover, the participants' novelty-seeking level depicted a continuous variable ranging from 21 to 105. From the survey, 83 respondents scored between 54 and 104; thus, the mean

and median were74.69 and 75, respectively.

Table 3. Summary statistics for outcome and control variables

Variables	Mean	Median	Std.	Min	Max
Independent Variables					
Age	32,91	27	11,49	19	67
Female	0,65	1	0,48	0	1
Chinese	0,55	1	0,5	0	1
Dutch	0,31	0	0,47	0	1
Other Countries	0,13	0	0,34	0	1
Solo travel	0,22	0	0,41	0	1
Education	2,42	2	0,73	1	4
LT_number	2,19	2	1,53	0	5
Expenditure	4,08	4	2,06	1	8
Matching Probability	0,41	0,5	0,22	0,03	0,9
AA_Index	0,18	0	0,45	-0,8	0,94
Dependent variable					
NS_Scores	74,69	75	11,15	54	104

4.2 Correlation Tests

The following hypotheses have been presented in Chapter 2.

H1: Age is negatively related to the level of novelty-seeking in leisure travel

H2: Ambiguity aversion is negatively related to the level of novelty-seeking in leisure travel

H3: An interaction effect exists between the novelty-seeking level and age with ambiguity aversion

H4: Having long-distance travel experience has a positive effect on the level of novelty-seeking in leisure travel

From Hypothesis 1, age and novelty-seeking level were expected to be negatively related. To determine the correlation and strength between the subjects' age and their levels of novelty-seeking in leisure travel, a correlation test was performed between the two variables. The Spearman rank correlation test was selected for the following reasons. Firstly, the novelty-seeking score does not follow a normal distribution so a non-parametric correlation test is preferred. Secondly, from the distribution of the two variables on the scatterplot (Figure 2), a monotonic relationship is expected between the paired data. Thirdly, age and the novelty-

seeking scores were measured on a continuous level. The result of the Spearman correlation test demonstrated that there is a moderate negative monotonic correlation between individual's age and the novelty seeking score, which was statistically significant (r = -0.30, p =0.0065).

Similarly, from Hypothesis 2, it was proffered that the AA Index and novelty-seeking level would have a negative correlation; however, the correlation appears to be very weak according to the scatterplot (Figure 3). Furthermore, the number of long-distance leisure travels and the level of novelty-seeking were also likely to have a positive relationship; therefore, the Spearman rank correlation test was performed again for those two paired variables: the results are depicted in Table 4. Because of the low rho value (r= 0.005 p=0.9621), it is suggested that there is no correlation between the AA_Index and the novelty-seeking score. As for the number of long-distance travel experiences, the correlations were not statistically significant except for LT_3 (r = 0.27, p=0.013), which indicates a weak positive relationship.

Hypothesis 3 states that the effect of age on novelty-seeking level varies depending on the subject's ambiguity aversion. Based on H1 and H2, it was predicted that ambiguity seeking (negative AA_Index) weakens the negative effect of age on novelty-seeking. This means the negative effect of age on novelty-seeking is weaker for ambiguity seekers than ambiguity averse subjects. Moreover, Age and AA_Index are supposed to be independent, otherwise, the model is biased; the independence between the two variables was tested by means of Spearman's rank correlation test (Table 7, Appendix C). The result suggests that Age and AA_Index are independent, since r = 0.055 (P= 0.6212).

Table 4. Spearman's rank correlation test

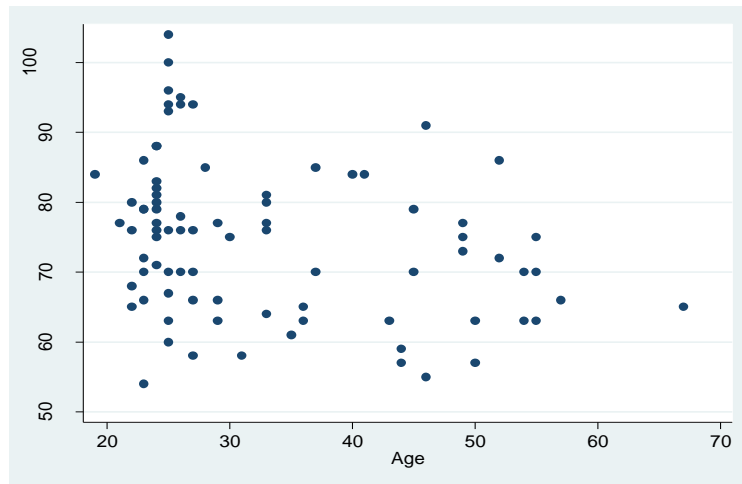|	Novelty-seeking Score		
	Spearman's rho	Prob > | t |	Observation
Age	(0,30)	0,0065	83
AA_Index	(0,005)	0,9621	83
Number of Long-distance leisure travel			83
LT_0	(0,036)	0,7486	83
LT_1	(0,045)	0,6893	83
LT_2	(0,032)	0,7715	83
LT_3	0,272	0,0130	83
LT_4	(0,031)	0,7801	83
LT_5	(0,1024)	0,3571	83

Figure 2. NS_Score and age

Figure 3. AA_Index and NS_Score
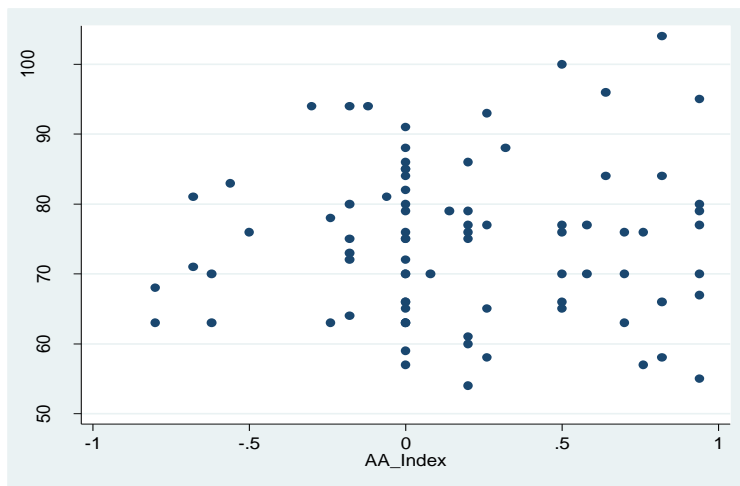
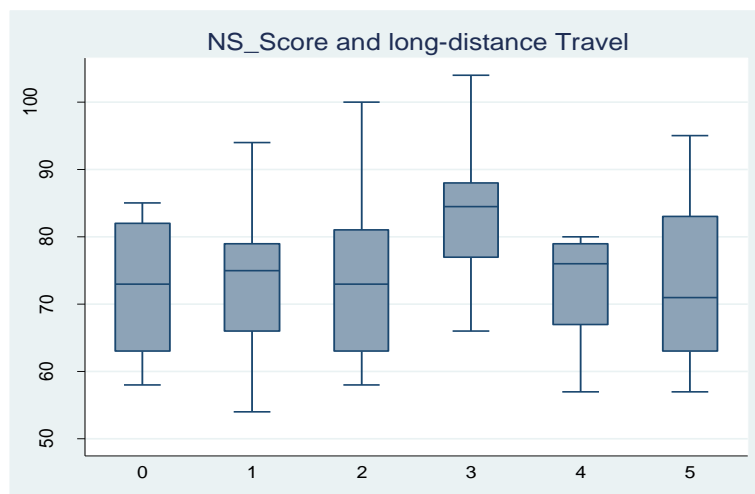**Figure 4.** Box Plot of Long-distance travel and NS_Score

Table 5. Regression on Novelty-seeking Score

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Dependent Variable NS_Score				
Age	(0,30)***		(0,30)***	(0,27)**	(0,28)**		(0,35)***
AA_Index		0,96	1,32	7,06	5,84		
Age*AA_Index				(0,17)	(0,13)		
Female					(1,28)		(3,10)
Chinese					0,44		2,68
Dutch					(1,97)		(0,11)
Solo travel					3,55		2,10
Education							
Edu_1					6,93		5,61
Edu_2					7,90		7,94
Edu_3					7,95		7,41
Long-distance Travel							
LT_1						1,30	3,67
LT_2						1,98	2,91
LT_3						10,67*	12,95**
LT_4						0,17	(0,04)
LT_5						0,92	3,19
Observations	83	83	83	83	83	83	83
R-square	0,1	0,002	0,1	0,1	0,15	0,08	0,24

Note *Significant at 10% level   **Significant at 5% level   ***Significant at 1% level

4.3 Regression analyses

4.3.1 Age, ambiguity and novelty-seeking level

Because the dependent variable (NS_Score) is measured on a continuous measurement scale, linear regressions were performed with both single and multiple explanatory variables. Table 5 presents the results of the regression model. Model 1 includes age as the only explanatory variable, while Model 2 used the AA Index which measures the ambiguity attitudes of subjects as the explanatory variable. Model 3 combines Model 1 and Model 2, while Model

4 added an interaction effect between age and the AA Index. Furthermore, Model 5 includes all the variables above with demographical controls.

From the regression results, H1 is supported. Age was significant in all the models, which indicates that an increase in age has a negative effect on the novelty-seeking score. This is in line with the prediction from the Spearman's rank correlation test. In Model 1, the unique explanatory variable's correlation coefficient is -0.3. This can be interpreted as a one year increase in age decreases the novelty-seeking score by 0.3 on average, ceteris paribus, and it is statistically significant at 1% level (P=0.005). The effect of age was also significant in multiple linear regressions, which included the AA Index (Model 3) and demographical variables (Model 5).

Moreover, the AA Index was insignificant in the single linear regression (Model 3), which infers that the negative relation between ambiguity aversion and the novelty-seeking score predicted by H2 is not supported.

An interaction effect of ambiguity aversion and age was proposed by H3 which predicted a different effect on age due to ambiguity aversion. The model can be written as:

$$\text{Novelty} - \widehat{\text{seeking}} \text{ Score}$$
$$= \beta 0 + \beta 1 * Age + \beta 2 * AA\_Index + \beta 3 * Age * AA\_Index + \varepsilon$$

If the interaction term is statistically significant, $\beta 1$ cannot be interpreted as the unique effect of age on novelty-seeking, since the interaction indicates that the effect of age on novelty-seeking is not limited to $\beta 1$, but also depends on the value of $\beta 3$ and the AA_Index. Thus, the effect of age is represented by everything that is multiplied by age in the model: $\beta 1 + \beta 3 *$AA_Index. Hence, $\beta 1$ can be interpreted as the unique effect only when the subject is ambiguity neutral (AA_Index=0).

Hypothesis 3 is not supported, because there was no significant effect of the interaction term on the novelty-seeking score. As illustrated in Table 5, the correlation coefficients of the interaction term in Models 4 and 5 are not statistically significant. In this case, ambiguity aversion is not serving as a moderator variable in the relationship between age and novelty-seeking.

4.3.2 Long-distance travel experiences and novelty-seeking level

Hypothesis 4 asserts that having long-distance travel experiences is positively correlated to the level of novelty-seeking in leisure travel. The respondents were grouped into six categories according to the number of their long-distance travels. The box plot (Figure 4) compares the novelty-seeking score among the six groups. Except for Group 3, all groups had similar median scores ranging between 70 and 80. Group 3, which categorizes the respondents having 11 to 15 long distance travels generally had a much higher median than all other groups. Compared to the group which never experienced long-distance travel (Group 0), Group 3 scored higher on all quartiles.

In addition to the other analyses, the quantitative effects were also analyzed from the regressions (Model 6 and Model 7). Group 0 was established as the reference group. All the correlation coefficients of long-distance travels were positive, but only one category (LT_3) was significant in the two models. This means that having 11 to 15 long-distance travel experiences increase the novelty-seeking score by 12.95 on average, ceteris paribus, compared to never having experienced long-distance travel (Model 7). This effect was significant at a 5% level (P=0.028). However, besides Group 3, other groups did not demonstrate significant effects compared to the reference group (LT_0).

The results from the regression generally support H4, but in a limited way because only one category exhibited a significant effect according to the P-values. Thus, it casts doubt on whether there is a correlation between the richness of experience and the novelty-seeking score. This is because LT_5, which is the category with the largest number of long-distance travels, does not depict a generally higher score when compared to the categories with fewer travels.

5. Discussion and Implications

The expected influence of ambiguity attitude was not supported by the results. Furthermore, ambiguity aversion did not have a significant effect on the novelty-seeking score in the regression models. The ambiguity aversion was measured by an artificial mechanism, namely, Ellsberg's paradox, because respondents' beliefs can be controlled. While such a mechanism is rarely the case in real life decisions because people have different levels of competence. Instead of ambiguity attitude, it could be that their knowledge and confidence determine their decisions. Hypothesis 3 was proposed because it was expected that ambiguity aversion can serve as a moderator between age and the novelty-seeking level. However, it was not supported; thus, ambiguity aversion did not moderate the relationship in the models.

The results indicate that age has a significant negative effect on the degree of novelty-seeking in leisure trips, but the effects are not strong (rho=0.3). This finding is in line with results from Weaver et al. (2009) who revealed that the most novelty-seeking cluster represented the youngest. Moreover, the model would be biased if the travel expenditure was related to both age and novelty-seeking. This is because wealth generally grows with years of working; therefore, older people may be willing to spend more money on leisure trips. In this case, these older individuals are less likely to go backpacking or have a self-organized trip to save money. In this case, they may have less chance to be exposure to a novelty environment. The independence test (Table 6 in Appendix C) was performed which demonstrated a weak positive correlation between age and yearly spending on leisure trips which was significant at 5% (r= 0.27, p= 0.014). However, no significant correlation was found between the novelty-seeking score and expenditure, inferring that expenditure was not a biased estimator in the model. Therefore, it appears that the travel expenditure does not influence the correlation between age and novelty-seeking.

Moreover, the results suggest that individuals who had experienced some long-distance travels are more novelty-seeking compared with individuals who have never had the experience. The long-distance travel experience was treated as a categorical variable with "never had long-distance travel" as the reference group. However, only category 3 (LT_3) had a significant effect on the novelty-seeking score, which implies there is not a trend of increasing novelty-seeking with more remote travel experiences.

Additionally, the effect of having long-distance travel experiences was significant at 5%, but the correlation was not strong (r=0.272). This could be explained by the fact that novelty seeking does not always have to be associated with new destinations (Feng and Jang, 2007),

since it is possible to have a sense of novelty and participate in exciting activities in familiar places. In this case, the correlation between inter-continental or long-distance travel and novelty is not strong.

Nevertheless, the study was subject to several limitations. Firstly, the accuracy of the data might be an issue, since the answers were based on the memories of experiences. This leaves room for forgetting facts and distortions. Moreover, it is more appropriate to offer real incentives in the survey section related to eliciting ambiguity attitudes.

Secondly, the survey was available in English and Chinese, but some of the respondents were neither English nor Chinese native speakers. Therefore, the reliability of the measurements might decrease as the respondents might have been subjective in their second language (Benjamin et al., 1996). Furthermore, because the novelty-seeking measurement part was fully verbal, non-native speakers may have felt confused and could have added some subjective interpretations to some items.

The study also provides some suggestions and directions for further study. It indicates that age plays an important role in determining the level of novelty; however, the reason behind it is rather vague and unclear. It could be interpreted that when more people are holding an opinion, novelty activities are more appropriate for young tourists. Another reason could be that young people are less conventional and less fearful of new undertakings. It would be interesting to fully determine what causes the effects of age on novelty-seeking. In addition, further research could focus on individual's travel competency and their preference of novelty-seeking. When people have more relative knowledge, they tend to be less ambiguity-averse toward the task (Dimmock et al., 2016); hence, competence could serve as a moderator of ambiguity aversion in relation to novelty-seeking.

Furthermore, this paper's findings can be utilized in marketing tourism. Firstly, the matching of offerings to tourists' lifestyles is an appropriate promotional strategy. For people who experience high arousal in their daily routine, a place that offers rest, relaxation, and peace and quiet will be appealing to them. Similarly, novel destinations with exciting activities may be attractive to someone who wants to break their daily routine and seeks stimulation. Secondly, it is better to recommend novel destinations and activities to younger individuals and people with more remote travel experiences.

6. Conclusion

Novelty-seeking is a crucial motivation for leisure travel and has been applied as a means of market segmentation in tourism. This study focused on the effects of ambiguity attitudes and several factors on novelty-seeking behaviors in the context of tourism. It further provides insights into tourists' preferences in selecting travel destinations and vacation activities. The results do not support Hypotheses 2 and 3, which suggest that ambiguity aversion does not have a significant effect on preference as related to novelty-seeking. It should also be noted that Hypothesis 1 and Hypothesis 4 are supported by the results. Tourists who had some long-distance travel experiences are more novelty-seeking compared to someone who never had the experience. Meanwhile, although tourists generally are in search of novelty, the empirical study suggests that an increase in age has a negative influence on the level of novelty-seeking in leisure travel.

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Appendices

Appendix A: Ambiguity aversion measurement

In the following game, you can choose between box U or box K, both containing 100 balls, which can be either black or red. One ball will be drawn from the box you have chosen.

You will win if a red ball is drawn.

For box K you can see the exact proportion of black and red balls. Box U also contains black and red balls, but the proportions are not shown in advance. Hence, both boxes contain 100 balls with two different colors (black and red). The composition of black and red balls is known (K) for box K and unknown for box (U).
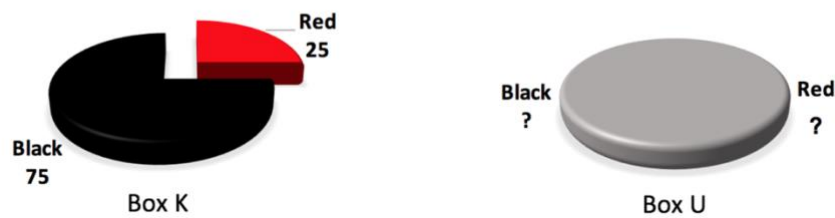

Please select the box of your choice: U or K. If you think both boxes are equally attractive, you can select Indifferent.

○ Box K

○ Box U

○ Indifferent

Figure 5. Screenshot initial display in the survey

We play the game again, but with a different proportion of black and red balls in box K. Everything else is the same. You can choose between box U or box K, both containing 100 balls, which can be either black or red. One ball will be drawn from the box you have chosen.

You will win if a red ball is drawn.

Please select the box of your choice: U or K. If you think both boxes are equally attractive, you can select Indifferent.

○ Box K

○ Box U

○ Indifferent

Figure 6. Screenshot after choice box K in Figure 5

Appendix B: Description of variable

Table 2 Variables in the survey

Variables	Definition
Age	Age in years
Female	Indicator for female
Chinese	Indicator if respondent's country of residence is China
Dutch	Indicator if respondent's country of residence is Netherland
Other Countries	Indicator if respondent's country of residence is country other than China and Netherlands
Solo travel	Indicator whether respondent mostly travel alone
Education	Indicator which highest education level respondent has completed (1=high school, 2=bachelor's degree, 3=master's degree, 4=doctoral degree
LT_number	Number of long distance leisure travel (0=never, 1=1 to 5, 2=6 to 10, 3=11 to 15, 4=16 to 20, 5= more than 20)
Expenditure	Expenditure on leisure travel per capita per year (1=less than €199, 2= €200 to €499, 3= €500 to €999, 4= €1000 to €1499, 5= €1500 to €1999, 6= €2000 to €2499, 7= €2499 to €2999, 8=more than €3000)
Matching Probability	The matching probability of respondent based on Ellsberg-type questions in the survey
AA_Index	A continuous variable which reflects respondent's degree of ambiguity aversion, ranging from -1 to 1
NS_Score	A continuous variable which reflects respondent's degree of novelty-seeking in leisure travel, ranging from 21 to 105. A higher score indicates more novelty-seeking.

Appendix C: Independent tests

Table 6. Independent test on Expenditure

	Expenditure Spearman's rho	Prob > | t |	Observation
Age	0,2679	0,0143	83
NS_Score	(0,1389)	0,2134	83

Table 7. Independent test on Age and AA_Index

	AA_Index Spearman's rho	Prob > | t |	Observation
Age	0,055	0,6216	83