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THE EFFECT OF RESOURCE SCARCITY ON CONSUMER BEHAVIOR REGARDING UGLY FOOD

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Abstract

This thesis examines how reminders of scarcity influence consumers' behavior regarding ugly food (i.e., edible food which does not meet aesthetic standards). The experiment showed that reminders of resource scarcity versus abundance increase the willingness to choose ugly food but do not influence the purchase intention and willingness to pay for ugly food. However, the increase in willingness to choose is not mediated by an increase in the importance of utilitarian benefits nor by a decrease in the importance of hedonic benefits. Thus, other possible mediators are suggested. Finally, managerial implications are discussed based on the findings.

Keywords: *ugly food, food waste, resource scarcity, hedonic, utilitarian, willingness to choose, purchase intention, willingness to pay*

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1. Introduction

Worldwide almost one-third of the edible food is wasted (FAO 2019), which is especially shocking when compared to the two billion people who do not have regular access to nutritious, sufficient and safe food (FAO 2020). Additionally, the sum of the greenhouse gases emitted as a result of food wastage would be the third-largest greenhouse gas emitting country in the world (WRI et al. 2016) contributing to 8-10% of global greenhouse gas emissions (Mbow et al. 2019). This is concerning considering the current development path of our environment.

Food loss and waste is the decrease in quantity or quality of food along the food supply chain (FAO 2019). The amount of food waste, which does not include inedible food, can be separated into food losses along production and supply chains and wasted food on the retailer and consumer level. This thesis will focus on the latter, namely food waste resulting from purchasing decisions by consumers, or decisions by retailers that affect consumer behavior, which accounts for 35% of total food wastage (FAO 2013). One major reason for the disposal of edible food at the retailer and consumer level is that the produce is too ugly (i.e., it physically deviates from some norm or does not meet the aesthetic standards). Strict aesthetic requirements force retailers to sort out products that do not meet the high-quality expectations in terms of their appearance (FAO 2011). Thus, even though neither food quality nor taste is affected, these food products end up being wasted.

Reducing food waste is important, considering that in 2050 we need to feed a population of 10 billion in a sustainable way (FAO 2019). As a countermeasure, the United Nations dedicated one of the sustainable development targets to food waste with the goal to halve food waste on the consumer and retail level until 2030 (United Nations 2015). Therefore, researchers, organizations, and companies have been trying to find ways to reduce the stigmatization of ugly food and motivate consumers to purchase ugly food. The German discount market Aldi, for example, has recently launched his new marketing campaign called

"Crooked Things" (in German: "Krumme Dinger") as part of the initiative "Refresh", which is an EU project to fight food waste (Aldi 2020). Another example is the French retailer Intermarché, which launched the advertising campaign 'Inglorious fruits and vegetables' in 2014, promoting imperfect produce and raising awareness about food waste (Intermarché 2014). Past research also tried to find ways to encourage consumers to purchase ugly food. For instance, a previous study has shown that presenting ugly food with an authenticity or a sustainability positioning can increase consumers' quality perception and purchase intentions (van Giesen and de Hooge 2019). Moreover, Loebnitz, Schuitema, and Grunert (2015) found that by increasing the awareness of food waste issues, pro-environmental consumers might be encouraged to purchase abnormally-shaped fruits and vegetables. Mookerjee, Cornil, and Hoegg (2019) showed that 'ugly' labels can positively affect the purchase of unappealing produce. However, research examining the perception of ugly food is still rare. Thus, in this research, I aim to contribute to this literature by examining whether a general sense of resource scarcity may influence the purchase intention, willingness to pay for and willingness to choose ugly food. This research is especially relevant considering the on-going Covid-19 crisis, which has triggered a sense of resource scarcity in many people's mind due to empty shelves and out-of-stock conditions at local supermarkets.

I predict that reminders of resource scarcity enhance consumers' preference towards ugly food because resource scarcity has been shown to influence consumers at different stages of their consumer decision journey (Hamilton et al. 2018). This is based on the theoretical reasoning that reminders of resource scarcity increase the importance of utilitarian benefits (vs. hedonic benefits) (Shah, Shafir, and Mullainathan 2015; Sevilla and Redden 2014; Laran and Salerno 2013; Cramer and Antonides 2011). While hedonic benefits provide "a pleasant feeling to the sense" (e.g., taste) (Hirschman and Holbrook 1982), utilitarian benefits represent the healthy and functional benefits provided by the food (Wertenbroch 1998). Food products offer

a combination of both utilitarian and hedonic benefits (Loebnitz and Grunert 2018), which consumers seek from their purchase (Maehle et al. 2015; Hirschman and Holbrook 1982). However, under conditions of scarcity, the most urgent needs capture attention (Shah, Shafir, and Mullainathan 2015). Hence, utilitarian benefits, such as reducing hunger, become more critical than hedonic benefits, such as appearance and taste. Furthermore, when people look for utilitarian benefits, the evaluation is highly cognitive driven (Homburg, Koschate, and Hoyer 2006). The consumer will focus more on the functional attributes, process information more systematically, and subsequently, rely less on short-cut decision-making rules, e.g., the beauty premium bias (Aigner, Wilken, and Geisendorf 2019). Hence, appearance loses importance and perception of ugly food improves. Moreover, previous research has shown that people shopping for utilitarian value are more inclined to respond positively to demand-generated scarcity (Ku et al. 2013).

In this thesis, I will test if a general sense of resource scarcity increases the importance of utilitarian benefits and hence, the consumers' likelihood to choose, purchase, and pay more for the ugly food. Being the first to investigate the relationship between resource scarcity and the perception of ugly food, I extend the literature on the effects of resource scarcity on consumers' food choice and on ways to reduce food waste. In addition, the results of my study provide relevant insights into how and why reminders of resource scarcity influence consumers' attitudes towards ugly food and reveal novel managerial actions to increase the effectiveness of food waste reduction actions.

2. Literature review

2.1. Consumers' food choice

Generally, consumers choose a food product when it responds to and satisfies consumers' needs (Heldmann 2004). Nevertheless, in reality, consumers' food choice is influenced by many interacting factors, and many researchers have tried to analyze and model the consumer decision process regarding food. One of the most prominent integrative frameworks is the 'Total Food Quality Model' from Grunert et al. (1996). Essentially, this model proposes that consumers form quality expectations in order to make purchase decisions and then, after the first purchase, compare the experienced quality to the expected quality to make future purchase decisions (Grunert 2002). Quality expectations are thereby formed based on cost cues and quality cues (Steenkamp 1990). Grunert's model is especially relevant because food choices are often based on simple cues like convenience and appearance due to time constraints and low involvement (Blaylock et al. 1999; Verbeke 2008). Olson and Jacoby (1972) distinguish between extrinsic and intrinsic quality cues. The most common extrinsic quality cues are the store setting, price, advertising claims and the brand. Intrinsic quality cues are physical characteristics of the product like appearance or shape. For unbranded and unlabeled fresh produce consumers have difficulties in forming quality expectations because extrinsic quality cues are not appropriate or not available to evaluate the product (Bredahl, Grunert, G., and Frewer 1998; Grunert 1997). In this case, consumers rely on visual inspection of characteristics such as the color, shape, size and general appearance to evaluate the food product's quality (Sogn-Grundvag and Østli 2009). This finding is supported by Hutchings (1977), who states in his research for Unilever that "the first impression of a food is usually visual, and a major part of our willingness to accept a food depends on its appearance" (p. 267). On the whole, previous research has shown that consumers do base their food choice on its appearance, implying ugly food is likely to be less chosen.

2.2. The beauty premium effect on food

The appearance of food is important, but why do consumer reject food when its appearance deviates from the standard? Previous research has demonstrated that consumers tend to reject unappealing food because of the "beauty premium" effect, i.e., people show negative biases toward aesthetically unattractive products, and assign a variety of negative attributions to it (Hoegg, Alba, and Dahl 2010; Dion, Berscheid, and Walster 1972). There are different theories on why consumers devalue unattractive food. Grewal et al. (2018) argue that merely imagining consuming unattractive food acts as a self-diagnostic signal that negatively impacts the consumers' self-perception. Furthermore, unappealing food is judged less tasty, less healthy (Chandon and Wansink 2012), and less natural (Hagen 2018). In general, this leads to a lower willingness to choose, pay for and purchase ugly food. Because food sellers are well aware of consumers' reluctance to buy ugly produce, they throw away large amounts of food that fail to meet aesthetic standards. As a consequence, in Germany, roughly 30% of all carrots and 10% of apples never reach the supermarket shelves (Noleppa and Cartsburg 2015).

2.3. Influence of resource scarcity on consumer's food choice

In a nutshell, scarcity can be defined as "a real or perceived threat to the consumer's ability to meet his or her needs and desires due to a lack of, or a lack of access to, goods, services or resources" (Hamilton et al. 2018, 533). Generally, scarcity promotes the opposite behavior in consumers, making them seek abundance to compensate for the shortage (Cialdini 2001). Previous research has demonstrated the effect of resource scarcity on consumer behavior across various domains (Aggarwal, Jun, and Huh 2011; Fan, Li, and Jiang 2019; Gupta 2013; van Herpen, Pieters, and Zeelenberg 2009). Moreover, Hamilton et al. (2018) show that scarcity can influence consumers at different stages of their decision journey. For instance, during the initial consideration phase resource scarcity can lead to increased monitoring of the social environment (Piff et al. 2012). During the evaluation process, scarcity can reduce the influence

of contextual cues (Shah, Shafir, and Mullainathan 2015). When choosing the product, scarcity increases the impulsivity (Griskevicius et al. 2013). Lastly, it also influences the consumption experience. For instance, consumers get more creative using the product and think about ways to use the product beyond the usual function (Mehta and Zhu 2016). Regarding food, past research has shown that scarcity leads individuals to consume as much food as possible (Sevilla and Redden 2014), and leads consumers to seek and consume food with high calories (Laran and Salerno 2013). Considering these findings, it might be that consumers care more about the aspect that a food product is supposed to satisfy hunger rather than other less critical aspects of food. This is supported by Shah, Shafir, and Mullainathan (2015) who argue that the most pressing and most essential needs capture attention under the condition of scarcity. It follows that resource scarcity might influence the consumer's decision journey regarding food in a way that it shifts the consumers' focus to the functional benefits, such as satisfying hunger, when evaluating and choosing food products rather than relying on the appearance and the beauty premium effect as selection criteria. The evaluation of utilitarian and hedonic benefits of food is discussed in the following to evaluate further how resource scarcity will affect the perception of ugly food, and more specifically, the beauty premium effect.

2.4. Evaluation of utilitarian vs. hedonic benefits of food

Consumer choices are driven by utilitarian and hedonic considerations (Ku et al. 2013; Dhar and Wertenbroch 2000), and most products possess hedonic and utilitarian benefits (Hirschman and Holbrook 1982). Thereby, the different benefits aim to fulfil different goals. Utilitarian benefits represent healthy and functional benefits provided by the food (Wertenbroch 1998), fulfil functional needs (Chitturi, Raghunathan, and Mahajan 2008), and are based on the fundamental goal to eat to satisfy hunger (Chandon and Wansink 2012). Hedonic benefits, on the other hand, follow people's desire for pleasure (Dhar and Wertenbroch 2000). In the food context, the most important hedonic benefits are taste and appearance, and the most important

utilitarian benefits are healthiness, energy supply, and performance improvement (Loebnitz and Grunert 2018; Cramer and Antonides 2011). The consumption goals, which are the benefits the consumer is looking for in the food product, determine how the product is being processed by the consumer (Chernev 2004). The goal of utilitarian benefits is to accomplish a functional task, i.e., what the product is supposed to do (Dhar and Wertenbroch 2000), e.g., food is supposed to give sufficient energy and nutrients. Hence, the evaluation is highly cognitive driven (Homburg, Koschate, and Hoyer 2006). The consumer will focus more on the functional attributes, process information more systematically, and subsequently, rely less on short-cut decision-making rules, such as the beauty premium bias (Aigner, Wilken, and Geisendorf 2019). If the salience of resource scarcity increases the importance of utilitarian benefits for consumers, hedonic benefits like appearance might become less important. Moreover, consumers will rely less on the beauty premium bias. This leads me to conclude that consumers might be more likely to choose ugly food because utilitarian benefits become more important than hedonic benefits.

3. Hypotheses

Altogether, I define the hypotheses as follows:

H_1: *When scarcity is salient, individuals will have a higher willingness to choose ugly food (H1a), a higher willingness to purchase ugly food (H1b), and a higher willingness to pay for ugly food (H1c)*

H_2: *When scarcity is salient, hedonic benefits become less important (H2a), utilitarian benefits become more important (H2b) and utilitarian benefits become more important than hedonic benefits (H2c).*

H3: *Individuals have a higher willingness to choose ugly food among prettier alternatives when individuals focus less on hedonic benefits (H3a), more on utilitarian benefits (H3b) and more on utilitarian benefits relative to hedonic benefits (H3c),*

An overview and the relationship of the hypotheses are in the conceptual framework below:

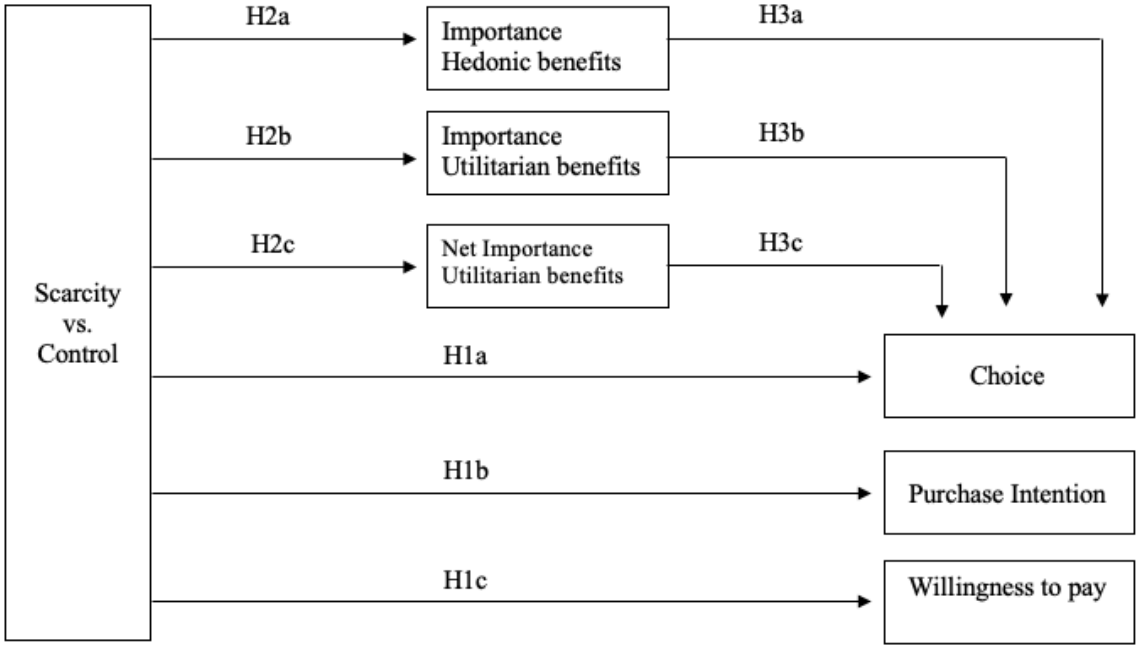

Figure 1: Overview of hypotheses and their relationships

4. Study

4.1. Methodology

Sample. The sample consisted of 193 participants (N=193) from 11 different countries who completed a short survey voluntarily for this study. Participants were randomly assigned to one of the priming conditions (scarcity vs. control). The most representative nationality is German, representing 85% of the sample (see appendix 1.1.). Of the 160 responses, 69% indicated to be female and 31% to be male (see appendix 1.2.). Most participants were between 18 to 25 years old, representing 51% of the cases (see appendix 1.3.). Furthermore, 48% of the participants are students, and 44% are employed (see appendix 1.3.).

Design and Procedure. The study followed a single factor 2 (scarcity vs. control) between-subjects design. The survey, which was available in English and German, was split into two parts (see appendix 2). The first part was used to manipulate the scarcity group's perception of resource scarcity. Following past research (Griskevicius et al. 2013; Jiang, Chen, and Wyer 2014), participants were first presented with a task to evaluate pictures regarding their brightness and clarity. Participants of the scarcity group viewed four photos featuring scenes related to resource scarcity (dried landscape with a child trying to get water; empty wallet; empty supermarket shelves; plate with little food). The control group was asked to evaluate four photos showing different landscapes (e.g., mountains, beach). Then, in a purportedly unrelated task, all participants were asked to imagine they were on their weekly grocery shopping trip. During this virtual grocery shopping participants needed to do different tasks to measure their purchase intention, willingness to pay and willingness to choose, which will be described in detail below. For this study, ugly fruits and vegetables were chosen because they are typically sold without information about flavor, health benefits or other types of persuasive information, which aim at influencing consumers. Furthermore, natural fruits and vegetables tend to not look perfect, and large parts are thrown away and wasted (Noleppa and Cartsburg 2015). The interactive tasks were followed by questions, which were used to measure the importance of utilitarian and hedonic benefits for the consumer, the control variables and demographics.

Purchase intention. Participants were told to imagine they are doing their weekly grocery shopping and stumble across a new store called "Misfit Foods". Further, they were told that they enter the store because they need to buy a bell pepper. Subsequently, a photo of a bell pepper with an abnormal shape was displayed (see appendix 2.4.). Then, based on scales developed by Dodds, Monroe, and Grewal (1991), purchase intention was measured. Participants needed to indicate on a 7-point Likert scale (1– "Strongly disagree"; 7- "Strongly

agree") to which extend they agree or disagree with the following three statements: "I would consider buying this one", "The likelihood of purchasing this item is very high", and "I would not purchase this food item" (reverse-coded).

Willingness to pay. After measuring the purchase intention, participants were asked how much they would be willing to pay for the depicted, abnormally shaped bell pepper. A reference price of 20 cents (average price) was given for one bell pepper. The participants could then express their willingness to pay by choosing a price between zero and 50 cents.

Choice. While the first two measures can show consumers' attitudes towards ugly food, in many cases consumers are exposed to optimal and suboptimal food at the same time. Therefore, a choice design including eight food items was built to measure the respondents' preferences when confronted with ugly food and more attractive alternatives. Participants were told to imagine that they are in the supermarket with a shopping list (see appendix 2.5.) and need to buy four lemons, four carrots, four apples and four eggplants. Because suboptimality can be specific for different fruits and vegetables, two different types of fruits and two different types of vegetables were included in the choice task. Apple, lemon, carrot and eggplant were chosen because these are popular fruit and vegetable types in Germany and Portugal, the two main countries, in which the study was conducted. After the introduction, eight images of each chosen fruit or vegetable were displayed in randomized order. Four out of the eight food items were optimal in terms of appearance, while the other four were suboptimal, only deviating in terms of appearance (i.e., being oddly shaped), not in terms of quality. Realistic images of lemons, apples, eggplants and carrots with naturally occurring abnormalities were taken from an earlier study from Loebnitz, Schuitema, and Grunert (2015) who have asked a commercial photographer to design the images so the fruits and vegetables would not deviate in color and size but only in their shape. Furthermore, they performed a pretest, which proved that the images were perceived as abnormal (Loebnitz, Schuitema, and Grunert 2015). Then, the

respondents indicated which four out of the eight fruits or vegetables they choose to put in their virtual shopping basket and purchase (given an identical price and quality). The average number of chosen ugly items per product was used to calculate the dependent variable *choice*.

Importance of hedonic and utilitarian benefits. The importance that consumers attach to utilitarian and hedonic benefits was measured by seven items on a 7-point Likert scale (1 - "Strongly Disagree"; 7 - "Strongly Agree"). Participants were asked for their reasons to buy fruits and vegetables. Taste, appearance and enjoyment are typical hedonic food benefits while typical utilitarian benefits include healthiness, giving energy and improving performance (Loebnitz and Grunert 2018; Cramer and Antonides 2011). Therefore, the following five items were chosen to measure the variable *importance hedonic benefits*: "because I really like the taste", "because I enjoy eating them", "because I like how they look" and "because I think they are aesthetic". The other three items were chosen to measure the variable *importance utilitarian benefits*: "because they make me less hungry", "because they give me energy" and "because they give me the nutrition I need". A first index for *importance hedonic benefits* was calculated as the mean of all hedonic items and used to measure the importance of the hedonic benefits. On the contrary, a second index for *importance utilitarian benefits*, represents the mean of all utilitarian items and hence, mirrors the importance of utilitarian benefits. A new variable *net utilitarian benefits* was calculated subtracting the mean of *importance hedonic benefits* from the score of *importance utilitarian benefits* to examine the relative importance of utilitarian benefits vs. hedonic benefits and see if participants attach greater weight to the utilitarian benefits.

Control variables. Finally, differences in individual consumer characteristics and preferences were measured. People with high awareness of food waste issues express significantly higher purchase intention for ugly food (Loebnitz, Schuitema, and Grunert 2015). Moreover, environmental concerns enhance food waste prevention behavior (Katt and Meixner

2020). Therefore, *environmental concern* and *awareness of food waste* were included as control variables. *Awareness of food waste* was measured based on a scale of Visschers, Wickli, and Siegrist (2016), and Loebnitz, Schuitema, and Grunert (2015). The measurement for *environmental concern* was adapted from Wei, Ang, and Jancenelle (2018) as well as De Magistris and Gracia (2008). Furthermore, the following variables were included as control variables: *mood*, *corona concern*, *gender,* and *age*. The PANAS-SF, which includes five positive and five negative items, was used to assess the average positive and negative mood (Watson, Clark, and Tellegen 1988) as seeing the pictures in the scarcity vs. control condition might affect participants' mood differently (see appendix 2.10.). Five items were included to measure the concern due to the COVID-19 crisis to control for the effect of the on-going COVID-19 crisis (see appendix 2.11.). Furthermore, gender and age were included as control variables as they might also influence the dependent variables.

4.2. Results and Analyses

Preparation of data. SPSS was chosen as a data analysis software. Twenty cases, in which the survey was not completed and missing crucial data, were deleted and excluded from the analysis. Missing values in the choice task occurred for all cases because only four out of eight fruits or vegetables should be chosen. Therefore, these missing values were recoded to zero as *choice* was dummy coded (Not chosen = 0, Chosen = 1). *Scarcity vs. control* was also dummy coded (Control = 0, Scarcity = 1). Next, an outlier analysis was performed (see appendix 3). Only for the variables *willingness to pay, importance hedonic benefits, importance utilitarian benefits* and *net utilitarian benefits* outliers were found, as observed in the boxplot. However, the outliers for *importance hedonic benefits, importance utilitarian benefits* and *net utilitarian benefits* were not removed since these values did not change the results and did not cause a violation of any assumptions for the further analyses. The outliers for *willingness to pay* were also kept in order to preserve the sample size. Items, which were negatively worded, were

recoded (Pallant 2007). A reliability analysis was performed prior to the main analysis to verify the scales' internal consistency (see appendix 4). For this, Cronbach's model was used, which is based on the average inter-item correlation. All scales had sufficient reliability (Cronbach α roughly equal to 0.70 or above), except the scale for *environmental concern* (Cronbach α = 0.50) and *awareness of food waste* (Cronbach α = 0.60). Cronbach alpha values can be small when there are below ten items in the scale as it is the case for the scale for *environmental concern* and *awareness of food waste* (DeVellis 2003). Thus, the mean inter-item correlation was used to verify reliability (DeVellis 2003). The inter-item correlation of the scale for *environmental concern* is 0.32 and for *awareness of food waste* is 0.34. Hence, it lays in the optimal range (0.2 and 0.4) discussed by Briggs and Cheek (1986).

Manipulation Check. In order to test whether the photos related to scarcity indeed caused a feeling of scarcity in the participant's mind the participants were asked to indicate the extent to which they agreed with the following statements: "Food is always available" (reverse-coded), "We live in a harsh environment" and "I am sometimes scared that there is not enough food for everyone" (scale: 1-"Strongly disagree" to 7-"Strongly agree"). The average of these items formed an index of perceived scarcity. Participants of the scarcity group showed higher perceived scarcity compared to those in the control group ($M_{Scarcity}$ = 4.00 vs. $M_{Control}$ =3.53, F (1, 191) = 4.53, p = .04). Thus, providing evidence that the manipulation was effective (see appendix 5).

ANOVA. A one-way between-groups analysis of variance (ANOVA) was conducted to analyze the impact of scarcity on the willingness to choose ugly food (H1a), to purchase ugly food (H1b) and to pay for ugly food (H1c). The dependent variable *purchase intention, willingness to pay* and *choice* are continuous variables. The independent variable *scarcity vs. control* is a categorical variable. Prior to analysis, the assumptions of ANOVA were tested, including normality and homogeneity of variances. The normality assumption could not be

verified using the Shapiro-Wilk-Test ($p_{\text{purchase intention}} = 0.00$, $p_{\text{willingness to pay}} = 0.00$, $p_{\text{choice}} = 0.00$) (see appendix 6.1.). However, ANOVA is still considered a robust statistical test (Schmider et al. 2010). Homogeneity of variances was asserted using Levene's test, which showed that equal variances could be assumed for the *willingness to pay* variable ($p = .90$) but not for *choice* ($p = .04$) and *purchase intention* ($p = .01$). Hence, for those latter two, a Welch's ANOVA was used to compare the means. There was no statistically significant difference in the mean scores for purchase intention between participants of the different groups at the $p<0.05$ level: ($M_{\text{Scarcity}} = 4.82$ vs. $M_{\text{Control}} = 4.73$, *Welch's F* $(1, 185.17) = .12$, $p = .73$) (see appendix 6.2.). There was also no statistically significant difference in the mean scores for the willingness to pay between participants of the different groups at the $p<0.05$ level: ($M_{\text{Scarcity}} = 20.73$ vs. $M_{\text{Control}} = 19.24$, $F(1, 190) = .86$, $p = .36$) (see appendix 6.3.). However, participants in the scarcity group indicated a higher willingness to choose ugly fruits and vegetables than the control group (see appendix 6.4.). This is represented by a statistically significant difference at the $p<0.05$ level in *choice* scores for the two groups: ($M_{\text{Scarcity}} = 1.14$ vs. $M_{\text{Control}} = 0.82$, *Welch's F* $(1, 182.75) = 6.54$, $p = 0.01$).

ANCOVA. In order to control for potential variables, which influence the dependent variable, a one-way analysis of covariance (ANCOVA) was performed. This enables to draw a more accurate conclusion. The covariates for the ANCOVA included *environmental concern, awareness of food waste, corona, mood*, *gender,* and *age*. Prior to analysis, the ANCOVA assumptions were verified, including homogeneity of the covariates across the two groups and homogeneity of regression slopes. Participants in the scarcity group still indicated a statistically significant higher willingness to choose ugly food in comparison to the ones in the control group, even when controlling for individual differences: ($M_{\text{Scarcity}} = 1.12$ vs. $M_{\text{Control}} = .85$, $F(1, 184) = 5.40$, $p = .02$) (see appendix 7.1.). *Environmental concern* ($p = .027$) and *gender* ($p = .033$) were also significant predictors of *choice*. Further investigations regarding these effects

can be found in the exploratory post-hoc analyses part. There was no statistically significant difference at p<.05 in the purchase intention between the groups: ($M_{Scarcity}$ = 4.77 vs. $M_{Control}$ = 4.78, F (1, 183) = .00, p = .99) (see appendix 7.2.). A significant predictor was gender (p = .000). There was no statistically significant difference at p<.05 in the willingness to pay between the groups: ($M_{Scarcity}$ = 20.59 vs. $M_{Control}$ = 19.38, F (1, 183) = .57, p = .45) (see appendix 7.3.)

Mediation Analysis. A serial mediator analysis was conducted to examine whether the effect of the independent variable *scarcity vs. control* on the dependent variable *choice* was mediated by the *importance of hedonic benefits*, *importance of utilitarian benefits,* or the relation of them both *net utilitarian benefits*. For all three potential mediators, a separate bootstrap analysis with 5,000 draws using the Process Model 4 of Hayes (2013) was applied. According to Hayes (2013), the coefficient and the p-value are important values that indicate the size and significance of the mediator's effect. If zero lies outside the confidence interval, the indirect effect is significant.

I*mportance of hedonic benefits* was analyzed as a potential single mediator to understand if the salience of resource scarcity reduces the importance of hedonic benefits and indirectly causes a higher willingness to choose ugly food (see appendix 8.1.). The direct effect, the independent variable predicting the dependent variable (X predicting Y) in the presence of the mediator, is .32 with a p-value of .01. Hence, the relationship is still significant with the mediator present. However, *scarcity vs. control* has no significant impact on *importance of hedonic benefits* (B = -.10, p = .53) and *importance of hedonic benefits* has no significant impact on *choice* (B = .03, p = .61). The total indirect effect is -.003 but is not significant as zero is included in the confidence interval range (*95% CI*: - .0235, .0204).

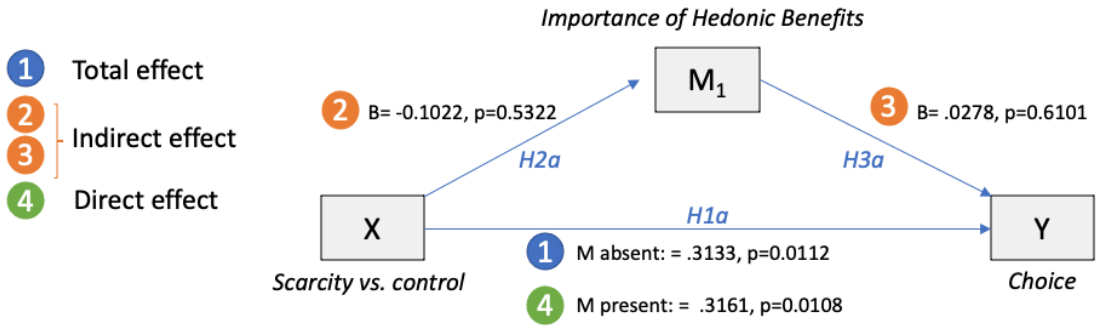

Figure 2: Statistical diagram – Mediation model 4 (Hayes 2013) with importance of hedonic benefits as a mediator

Importance of utilitarian benefits was analyzed as a potential single mediator to understand if the feeling of resource scarcity increases the importance of utilitarian benefits and indirectly causes a higher willingness to choose ugly food (see appendix 8.2.). The direct effect is .30 with a p-value of .01. Hence, the relationship is still significant with the mediator present. *Scarcity vs. control* has no effect on *importance of utilitarian benefits* (B = -.08, p = .66) while *importance of utilitarian benefits* has a significant impact on *choice* (B = -.12, p = .02). The total indirect effect is - .01 but is not significant as zero is included in the confidence interval range (*95% CI*: - .0622, .0618).

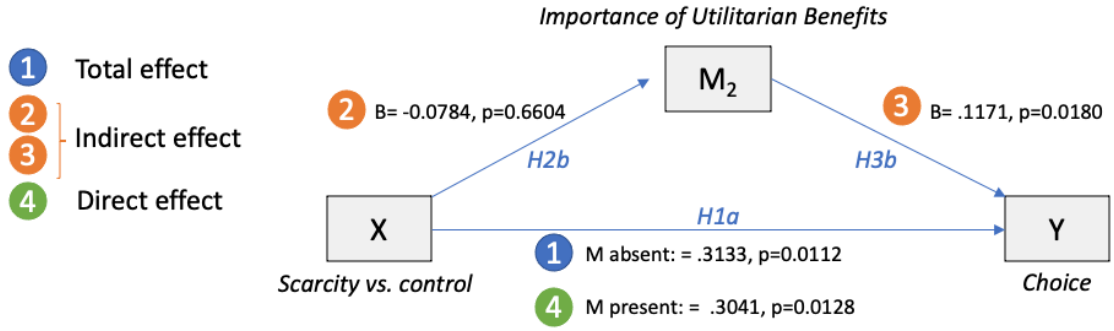

Figure 3: Statistical diagram - Mediation model 4 (Hayes 2013) with importance of utilitarian benefits as a mediator

The importance of utilitarian benefits relative to hedonic benefits *(*Net utilitarian benefits*)* was analyzed as a potential single mediator to understand if the feeling of resource scarcity increases the importance of utilitarian benefits over hedonic benefits and indirectly causes a higher willingness to choose ugly food (see appendix 8.3.). The direct effect is .32

with a p-value of .01. Hence, the relationship is still significant with the mediator present. *Scarcity vs. control* is not a predictor of *Net Utilitarian benefits* (B= -.02, p= .87) while *net utilitarian benefits* has an effect on *choice* (B= .0.21, p= .00). The total indirect effect is .01 but is not significant as zero was included in confidence interval range (*95% CI*: - .0287, .0655).

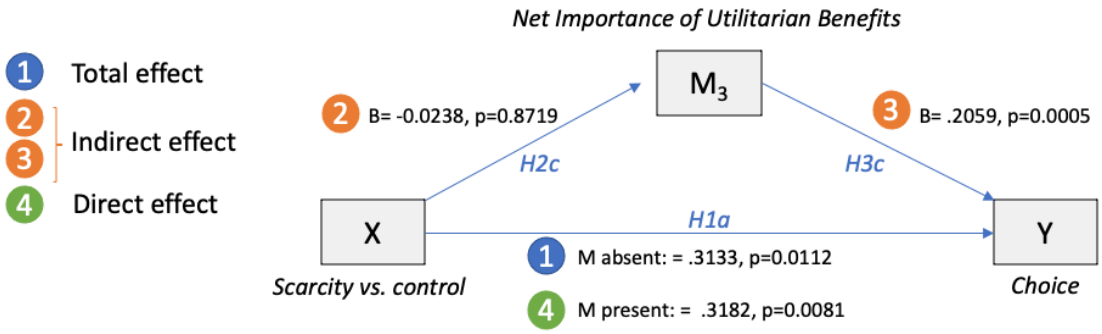

Figure 4: Statistical diagram - Mediation model 4 (Hayes 2013) with net importance of utilitarian benefits as a mediator

3.3. Exploratory analysis

More ANOVAs were conducted to further investigate the influence of different variables on participants' choice and purchasing behavior. An interesting finding was that women were more likely to choose ugly food than men (M_{Female} = 1.11 vs. M_{Male} = .70, $F(1, 191) = 9.75$, $p = .00$), more likely to purchase ugly food (M_{Female} = 5.20 vs. M_{Male} = 3.92, $F(1, 191) = 20.30$, p = .00) and have a higher willingness to pay for ugly food (M $_{Female}$ = 21.23 vs. M $_{Male}$ = 17.19, $F(1, 19) = 5.53$, $p = .02$) (see appendix 9). There was no significant relationship between the respondents' country of residence and the choice of ugly food, comparing Germany against all other countries (M_{German} = .99 vs. M_{Other} = .91, $F(1, 191) = .26$, $p = .61$) (see appendix 10). Furthermore, participants' feedback indicated that the difference between the normal and the ugly lemon was too minor to notice. Therefore, another ANOVA was conducted to compare the choice of ugly food between the groups without considering the lemon. The results showed an even more significant difference between the scarcity and the control group ($M_{Scarcity}$ = 1.10 vs. $M_{Control}$ = .74, $F(1, 191) = 7.79$, $p = .00$), and again validated that people who feel a sense

of scarcity are more likely to choose ugly food (see appendix 11). Another interesting finding was that an individual's environmental concern positively effects the willingness to choose (β = .25, p = .00) (see appendix 12).

4.Discussion

4.1. Summary of findings

While scarcity did not influence the purchase intention and willingness to pay, participants from the scarcity group showed a higher willingness to choose ugly fruits and vegetables than the ones in the control group. This was significant even when controlling for individual differences. However, the hypothesis that this effect was mediated by the importance of utilitarian and hedonic benefits was not supported by the statistical results. As such, the reason for what caused the higher willingness to choose ugly food in the scarcity group remains unknown. Therefore, hereinafter three potential other mediators are discussed. First, past research has shown that scarcity triggers a feeling of urgency (Aggarwal, Jun, and Huh 2011; Gupta 2013) and increases the impulsivity (Griskevicius et al. 2013). Perhaps, people from the scarcity group had a higher feeling of urgency and were more impulsive, which led to a decrease in the importance of the food's appearance. Hence, they were more willing to choose ugly food. Second, Fromkin et al. (1971) mention the possibility that in some situations of restricted availability, social motives might arise. Verhallen (1982) argues that altruistic motives cause people not to choose the limitedly available alternatives but instead leave it for others. Moreover, resource scarcity increases the likelihood of engaging in prosocial and ethical behaviors among those who are low in subjective resources (Miller, Kahle, and Hastings 2015; Piff et al. 2010) and increases the monitoring of the social environment (Piff et al. 2012). Furthermore, women, who were shown to be significantly more likely to choose ugly food than men, are generally more likely to be prosocial and altruistic (Beutel and Mooney 1995). Therefore, the feeling of scarcity might have caused the participants to not only choose the good-looking food but also pick some of

the ugly food because of altruistic motives. This would also explain why the effect of scarcity on purchase intention and willingness to pay was not significant while the effect on the willingness to choose was. Lastly, past research shows that exposure to ecological resource scarcity can promote an individual's pro-environmental behavior (Gu et al. 2020), and people with pro-environmental self-identities express significantly higher purchase intention for abnormally-shaped food (Loebnitz, Schuitema, and Grunert 2015). Furthermore, Katt and Meixner (2020) have shown that environmental concerns can have a positive effect on food waste prevention behavior. Moreover, the post-hoc analysis showed a significant positive relationship between environmental concern and the willingness to choose. Therefore, pro-environmental behavior could be another potential mediator.

4.2. Managerial Implications

Based on these findings, there are considerable managerial implications for managers in the food industry. We know from past research that presenting ugly food with a sustainability positioning (e.g., 'Embrace Imperfection: Join the fight against food waste!') or with an authenticity positioning (e.g., 'Naturally imperfect: Apples the way they actually look') can enhance consumers' quality perceptions and purchase intentions of those products. While these positionings present a good starting point for designing an effective communication strategy, I would like to propose further recommendations by answering three questions: What is the marketing message, how can the message be transmitted, and where should the message be transmitted? Firstly, the message should be that resources are scare because reminders of resource scarcity have shown to lead to a higher willingness to choose suboptimal food. Secondly, the message can be either transmitted sub-consciously (e.g., showing photos that trigger a sense of scarcity such as the ones used in the study), or can be transmitted consciously (e.g., displaying clear facts about resource scarcity or people that actively approach consumer to raise awareness of resource scarcity). Thirdly, the message should be transmitted not long

before the actual shopping to have the best effect on consumers' behaviors. Ideally, the message can be transmitted right before the consumer enters the store or while the consumer shops. Additionally, geo-targeting can be used to target customers who will potentially enter the store soon. Then, the message can be shown to them, e.g., through ads on social networks. In order to achieve a larger impact, managers could incorporate these communication initiatives in a bigger campaign around food waste. This can include donating unsold food to charities, informing customers how to reduce food waste on social media or enabling customers to sell fruits and vegetables in smaller quantities. The potential actions are endless, and as many other supermarket chains already have active campaigns against food waste, this is an important strategic action to stay competitive and avoid a bad reputation.

5. Limitations and future research

This research has certain limitations. First, the sample was comprised mostly of German participants. While there was no significant relationship between whether a person was German or from another country and the choice of ugly food, having a sample with more diversity in terms of nationalities would be beneficial to conclude further country specific managerial implications. Second, reminders of resource scarcity did not influence the willingness to choose ugly lemons as it was the case for the other fruits and vegetables. Participants' feedback indicated that lemons were too similar in terms of their appearance and that they could sometimes not detect the difference between the optimal and suboptimal lemon. Future research should ensure that the suboptimal food clearly deviates from the optimal food. Third, the scarcity appeal was communicated in an experiment, which generally leads to a lower perceived scarcity compared to when scarcity appeal is communicated by salespeople (Verhallen 1982). Future research should conduct a field experiment in a supermarket to get more realistic results. Fourth, all scales included less than ten items in order to keep the survey reasonably short. Moreover, the scales for *environmental concern* and *awareness of food waste* had Cronbach's

values below 0.7. Hence, a more comprehensive study should include scales with a higher number of items to increase the reliability of the different scales and measures. Finally, future research should also investigate potential other mediators, which were discussed in the section general findings. For instance, impulsiveness could be measured by taking the time participants need to select the fruits and vegetables, or could be measured by the "Impulsive Buying Tendency" scale (Weun, Jones, and Beatty 1998). Behavior economic games, such as the dictator game, could be incorporated to measure altruistic behavior (Benenson, Pascoe, and Radmore 2007). The pro-environmental behavior scale used by Gu et al. (2020) could be taken into consideration in order to conduct a mediation analysis, including pro-environmental behavior as a mediator. Besides the mediator analyses, the difference in the willingness to choose, purchase and pay for ugly food between the different genders is another interesting research topic for future research.

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8. Appendices

Appendix 1: Sample

Appendix 1.1.: Nationality distribution

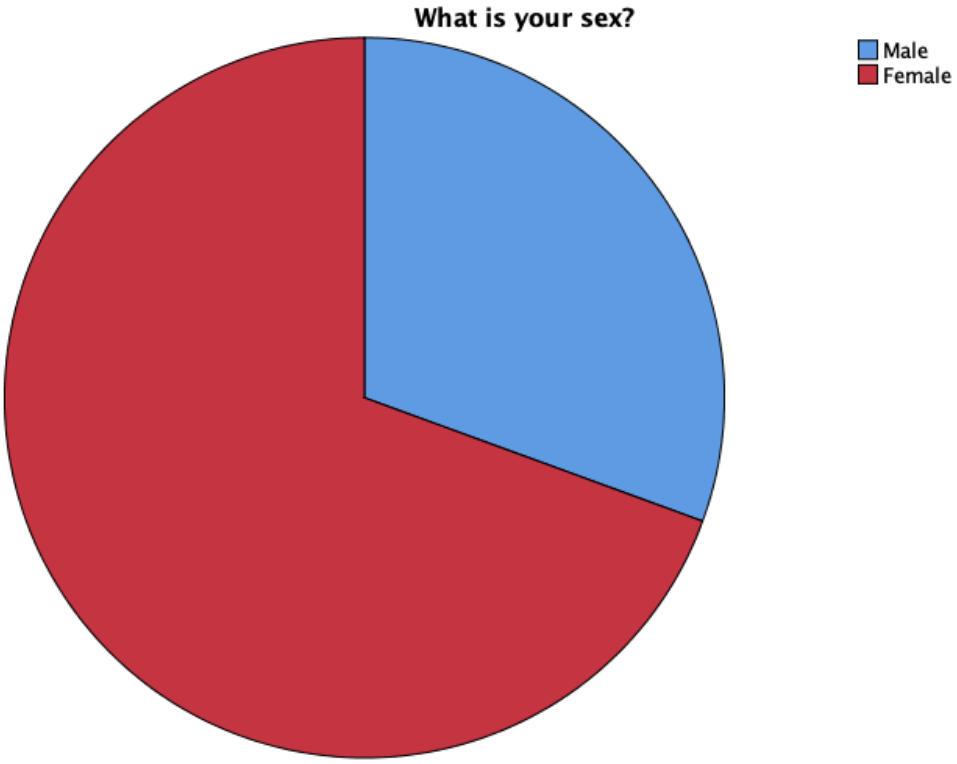
List of Countries

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Australia	1	,5	,5	,5
	Austria	2	1,0	1,0	1,6
	Brazil	2	1,0	1,0	2,6
	Czech Republic	1	,5	,5	3,1
	France	2	1,0	1,0	4,1
	Germany	164	85,0	85,0	89,1
	Italy	1	,5	,5	89,6
	Netherlands	1	,5	,5	90,2
	Portugal	15	7,8	7,8	97,9
	Romania	1	,5	,5	98,4
	United States of America	3	1,6	1,6	100,0
	Total	193	100,0	100,0	

Appendix 1.2.: Gender distribution

What is your sex?

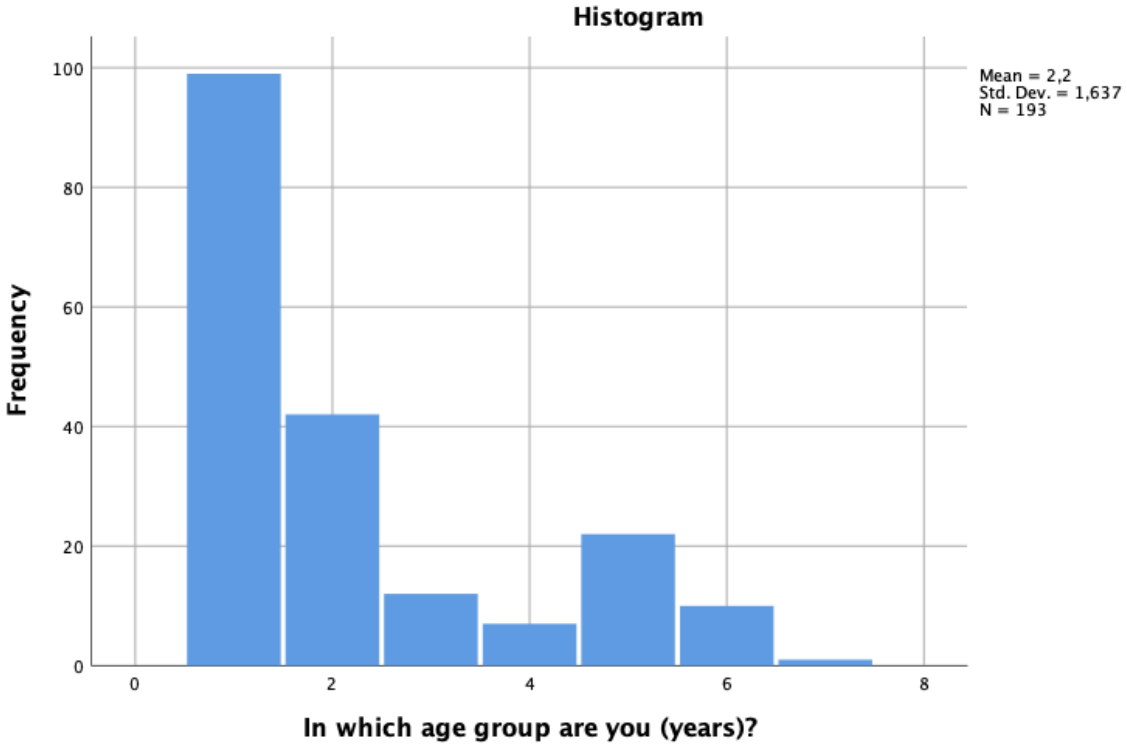
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	59	30,6	30,6	30,6
	Female	134	69,4	69,4	100,0
	Total	193	100,0	100,0	



Appendix 1.3.: Age distribution

In which age group are you (years)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	99	51,3	51,3	51,3
	26-33	42	21,8	21,8	73,1
	34-40	12	6,2	6,2	79,3
	41-48	7	3,6	3,6	82,9
	49-56	22	11,4	11,4	94,3
	57-64	10	5,2	5,2	99,5
	65-72	1	,5	,5	100,0
	Total	193	100,0	100,0	



Appendix 1.4.: Occupation

What's your current occupation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	93	48,2	48,2	48,2
	Trainee	1	,5	,5	48,7
	Employed	85	44,0	44,0	92,7
	Self-Employed	8	4,1	4,1	96,9
	Unemployed	1	,5	,5	97,4
	Retired	5	2,6	2,6	100,0
	Total	193	100,0	100,0	

Appendix 2. Survey

Appendix 2.1.: Introduction

English

Disclaimer & Demographics

DISCLAIMER

This is a research project being conducted as part of the master thesis of Marie Rebmann from Nova SBE. The purpose of this research project is to examine consumer behavior and choice.

Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdraw at any time.

The procedure involves filling an online survey that will take approximately 10 minutes. Your responses will be confidential and we do not collect identifying information such as your name, email address or IP address.

The survey questions will be split into two separate, unrelated parts: in the **first part** you will analyze pictures and in the **second part** you will go grocery shopping for fruits and vegetables.
The results of this study will be used for scholarly purposes only and may be shared with Nova SBE representatives.

If you have any questions about the research study, please contact marie-rebmann@web.de

Clicking on the "agree" button below indicates that:

- you have read the above information
- you voluntarily agree to participate
- you are at least 18 years of age

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

◯ Agree
◯ Disagree

Appendix 2.2.: First part for Scarcity Group

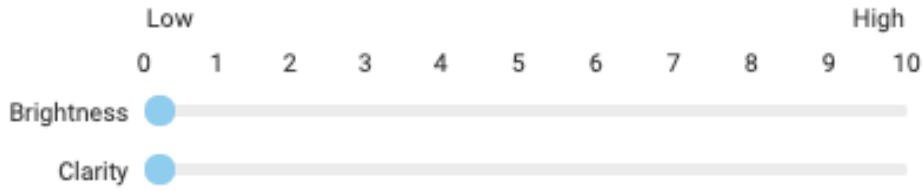
Salience of Scarcity

Part 1: Evaluation of pictures

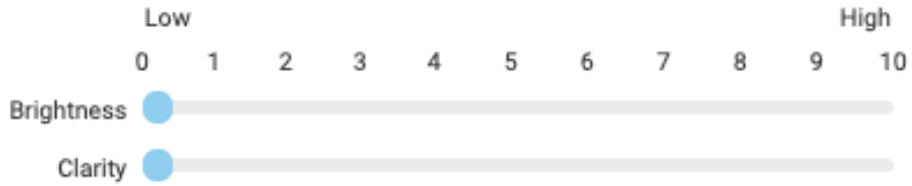
Take a close look at the photos and please rate each picture in terms of brightness and clarity.

Zero = Very low in brightness and clarity
Ten = Very high in brightness and clarity

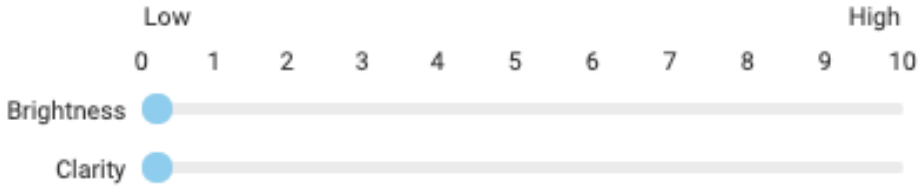
Please indicate the level of brightness and clarity (0 - low to 10 - high)



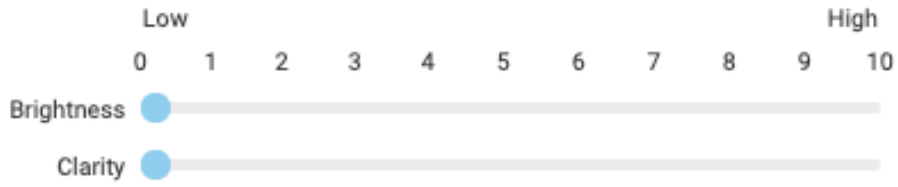
Please indicate the level of brightness and clarity (0 - low to 10 - high)



Please indicate the level of brightness and clarity (0 - low to 10 - high)



Please indicate the level of brightness and clarity (0 - low to 10 - high)



Appendix 2.3.: First part for Control group

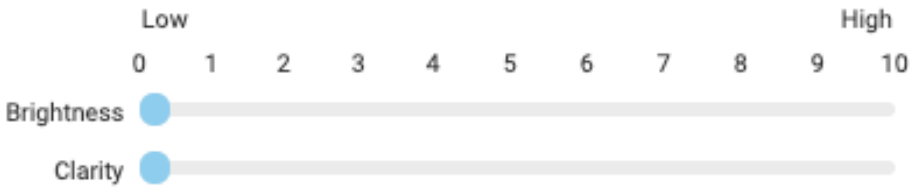
Control Group

Part 1: Evaluation of pictures

Please rate each picture in terms of brightness and clarity.

Zero = Very low in brightness and clarity
Ten = Very high in brightness and clarity

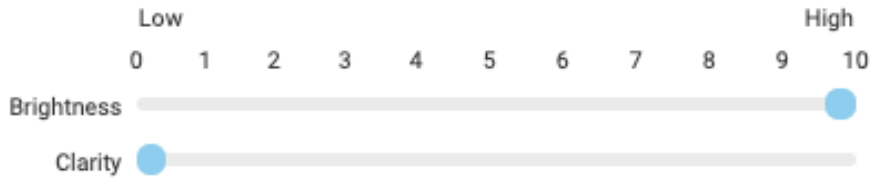
Please indicate the level of brightness and clarity (0 - low to 10 - high)



Please indicate the level of brightness and clarity (0 - low to 10 - high)

Please indicate the level of brightness and clarity (0 - low to 10 - high)

Please indicate the level of brightness and clarity (0 - low to 10 - high)



Appendix 2.4.: Purchase Intention & Willingness to Pay (both groups)

Puchase intention & Willingness to pay

Part 2: Grocery Shopping

You are on your weekly shopping trip and encounter this new store called *Misfit Foods*.

Because you need to buy a bell pepper you enter the store where you see this bell pepper displayed:

Please indicate to which extend you agree or disagree with the statements.

	1- Totally disagree	2	3	4	5	6	7- Totally agree
The likelihood of purchasing this food item is very high	○	○	○	○	○	○	○
I would not purchase this food item	○	○	○	○	○	○	○
I would consider buying this one	○	○	○	○	○	○	○

How much would you be willing to pay for this bell pepper?

Information:
- Average price for one bell pepper = 20 cent

0 5 10 15 20 25 30 35 40 45 50

Willingness to pay in cent

Appendix 2.5.: Choice (both groups)

Second Part: Product evaluation & choice

Part 2: Grocery Shopping

In this part we want to understand your behavior when it comes to choosing among different fruits and vegetables. Therefore please imagine you are in the supermarket with the following shopping list:

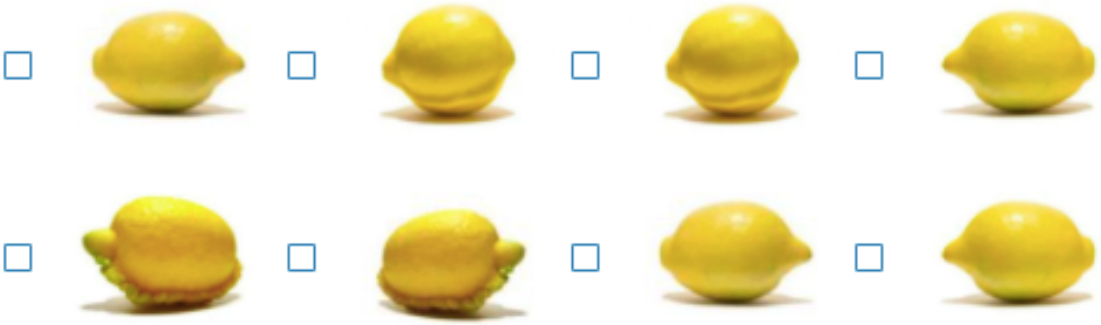
You will see the different fruits and vegetables on display. Please choose the ones you would pick and purchase. After your shopping trip, we will ask you some questions about your shopping behavior.

Pick the 4 apples you want to add to your shopping basket and purchase

(the price and quality for each apple is the same)

Pick the 4 lemons you want to add to your shopping basket and purchase

(the price and quality for each lemon is the same)



Pick the 4 carrots you want to add to your shopping basket and purchase

(the price and quality for each carrot is the same)

Pick the 4 eggplants you want to add to your shopping basket and purchase

(the price and quality for each eggplant is the same)

Appendix 2.6.: Importance of Hedonic and Utilitarian benefits (both groups)

Hedonic vs. Utilitarian shopping motives

I buy fruits and vegetables because ...

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
... they give me the nutritions I need	○	○	○	○	○	○	○
... they make me less hungry	○	○	○	○	○	○	○
... they give me energy	○	○	○	○	○	○	○
... I think they are aesthetic	○	○	○	○	○	○	○
... I like how they look	○	○	○	○	○	○	○
... I really enjoy eating them	○	○	○	○	○	○	○
... I really like the taste	○	○	○	○	○	○	○

Appendix 2.7.: Manipulation Check

Manipulation Check & Covariates

For this last part, we want to get to know you and your view of the world a little bit better.

Think about the world as it is today and please indicate to which extend you agree or disagree with the statements.

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
I am sometimes scared there is not enough food for everyone	○	○	○	○	○	○	○
We live in a harsh environment	○	○	○	○	○	○	○
Food is always available	○	○	○	○	○	○	○

Appendix 2.8.: Environmental Concern

Please indicate to which extend you agree or disagree with the statements.

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
Environmental problems do not affect my life personally	○	○	○	○	○	○	○
The current development path is destroying the environment	○	○	○	○	○	○	○
Unless we do something, environmental damage will be irreversible	○	○	○	○	○	○	○

Appendix 2.9.: Awareness of food waste

Please indicate to which extend you agree or disagree with the statements.

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
I try to waste no food at all	○	○	○	○	○	○	○
I am very well informed about the issue of food waste	○	○	○	○	○	○	○
We can avoid food waste by selling fruits and vegetables with 'abnormal' shapes	○	○	○	○	○	○	○

Appendix 2.10.: PANAS Scale

Please indicate how you feel **at this moment**

	1 - not at all	2	3	4	5	6	7 - very much
upset	○	○	○	○	○	○	○
hostile	○	○	○	○	○	○	○
alert	○	○	○	○	○	○	○
ashamed	○	○	○	○	○	○	○
inspired	○	○	○	○	○	○	○
nervous	○	○	○	○	○	○	○
determined	○	○	○	○	○	○	○
attentive	○	○	○	○	○	○	○
afraid	○	○	○	○	○	○	○
active	○	○	○	○	○	○	○

Appendix 2.11.: Corona Concern

Please indicate to which extend you agree or disagree with the statements.

	1- Strongly disagree	2	3	4	5	6	7- Strongly agree
Thinking about the Coronavirus makes me feel threatened	○	○	○	○	○	○	○
I am not worried about the Coronavirus	○	○	○	○	○	○	○
I am stressed around other people because I worry I will catch the coronavirus	○	○	○	○	○	○	○
I have tried hard to avoid other people because I don't want to get sick	○	○	○	○	○	○	○
I am worried that I or people I love will get sick from the coronavirus	○	○	○	○	○	○	○

Appendix 2.12.: Demographics

What is your sex?

- ○ Male
- ○ Female
- ○ I prefer not to answer

Which country are you from?

In which age group are you (years)?

- ○ 18-25
- ○ 26-33
- ○ 34-40
- ○ 41-48
- ○ 49-56
- ○ 57-64
- ○ 65-72
- ○ > 72

What's your current occupation?

- ○ Student
- ○ Trainee
- ○ Employed
- ○ Self-Employed
- ○ Unemployed
- ○ Retired

Appendix 2.13.: Debrief & Thank You

Debrief & Thank you

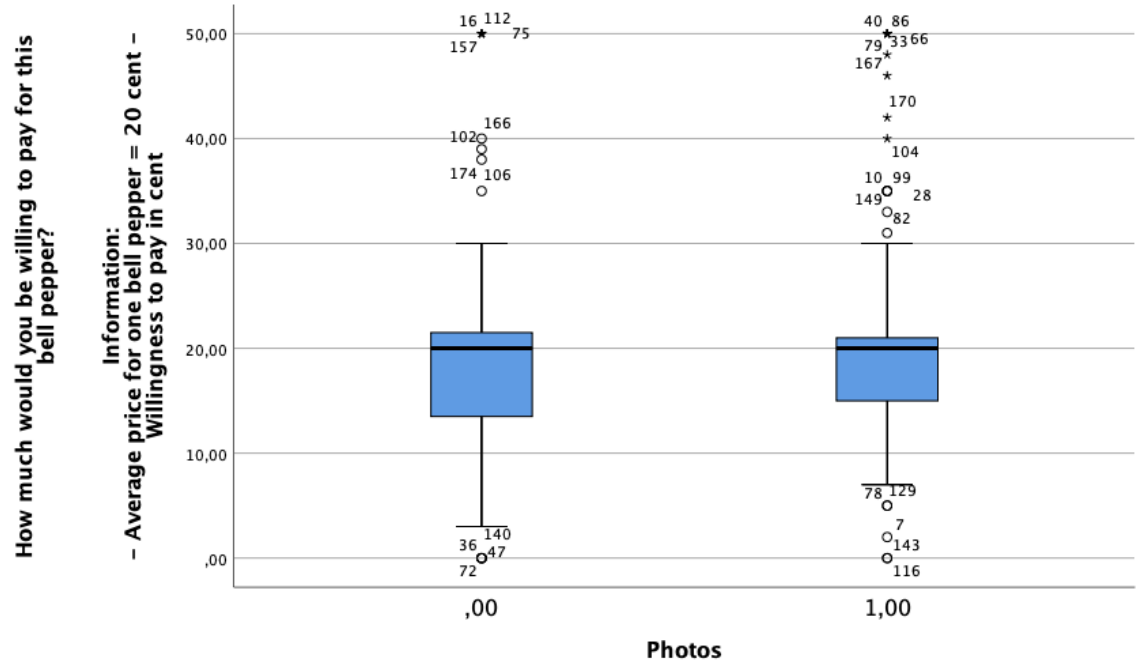
DEBRIEF

In this study, my purpose is to test if resource scarcity has an influence on how you choose fruits. More particularly, if you are more likely to choose ugly fruits and vegetables if resource scarcity is salient.

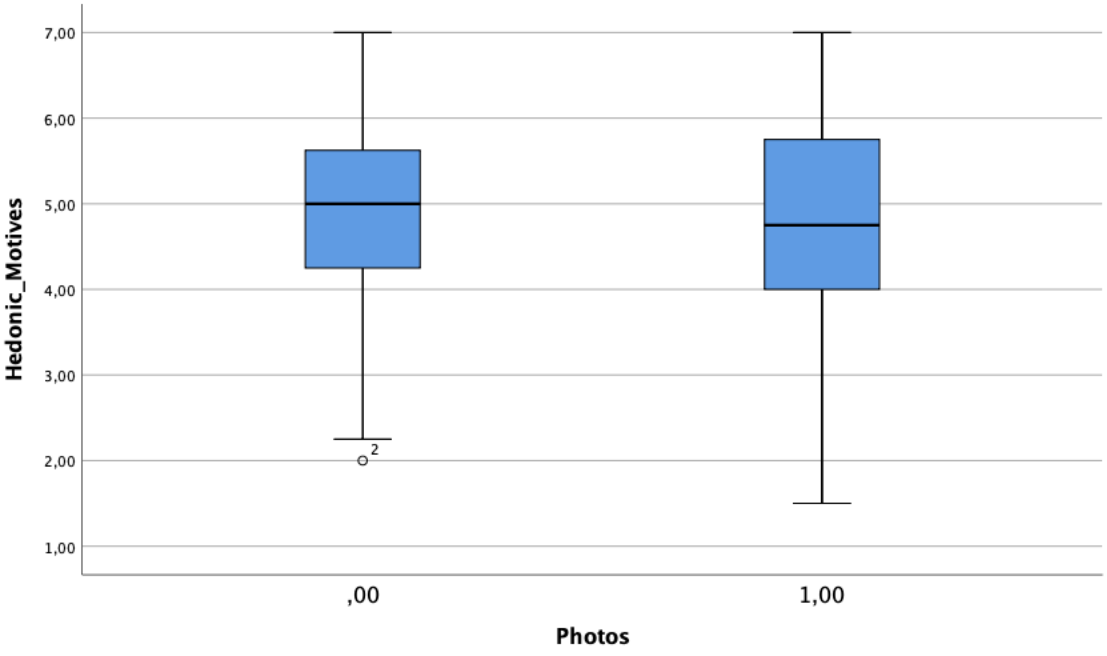
THANK YOU FOR YOUR TIME!

Appendix 3: Outliers

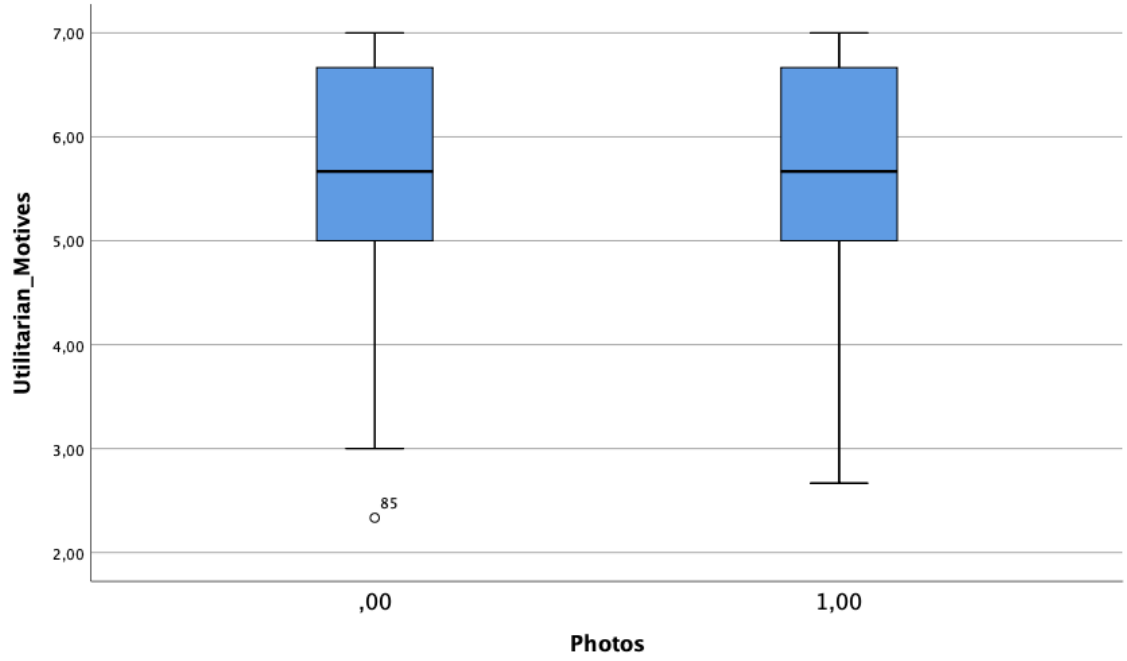
Appendix 3.1.: Willingness to Pay



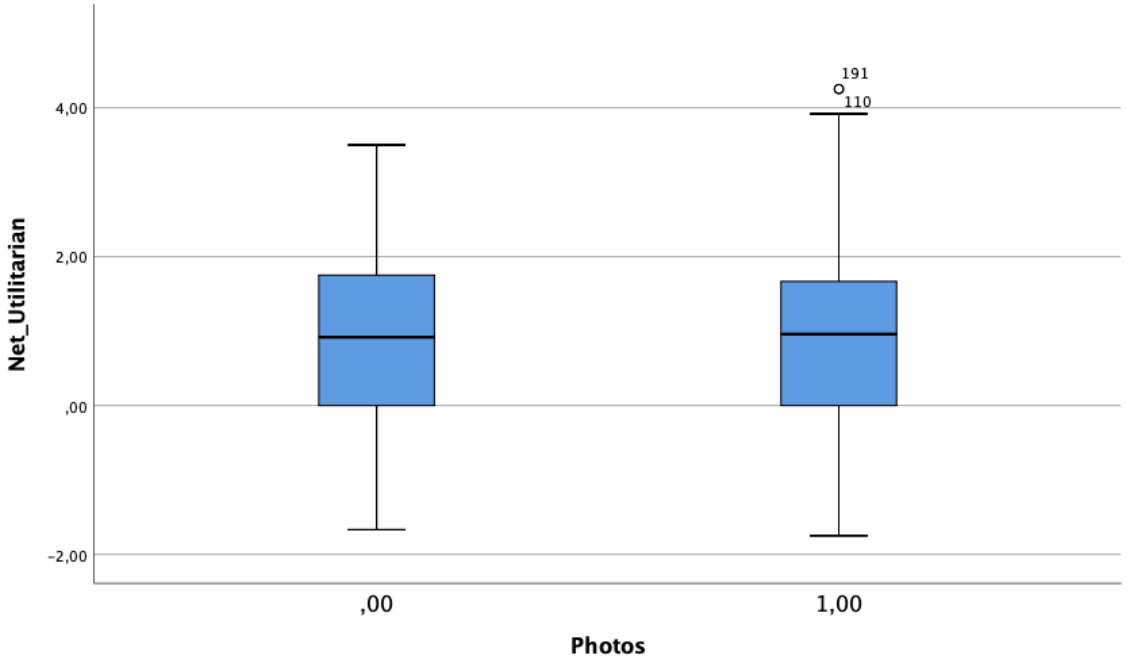
Appendix 3.2.: Hedonic Benefits



Appendix 3.3.: Utilitarian Benefits



Appendix 3.4.: Net Utilitarian Benefits



Appendix 4: Reliability Analysis

Purchase Intention Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,914	,915	3

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	,783	,744	,852	,107	1,144	,003	3

Hedonic and Utilitarian Benefits Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,719	,741	7

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	,290	,027	,784	,757	28,752	,035	7

Manipulation Check Scarcity Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,675	,678	3

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	,412	,382	,435	,053	1,139	,001	3

Environmental Concern Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,499	,582	3

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	,317	,089	,714	,625	8,035	,095	3

Awareness of Food Waste Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,595	,602	3

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	,335	,230	,508	,279	2,214	,018	3

Corona Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,798	,799	5

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	,443	,251	,606	,355	2,414	,011	5

Appendix 5: ANOVA Manipulation Check (Photos & Perception of Scarcity)

Descriptives

Perception_Scarcity

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
,00	97	3,5258	1,47811	,15008	3,2279	3,8237	1,00	7,00
1,00	96	4,0000	1,61426	,16476	3,6729	4,3271	1,00	7,00
Total	193	3,7617	1,56150	,11240	3,5400	3,9834	1,00	7,00

ANOVA

Perception_Scarcity

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10,851	1	10,851	4,532	,035
Within Groups	457,297	191	2,394		
Total	468,147	192			

Appendix 6: ANOVAs Purchase Intention / Willingness to Pay / Choice

Appendix 6.1.: Test of Normality

Willingness to pay → Shaprio-Will < 0,05 → test could not verify normal distribution → CLT

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Photos	Statistic	df	Sig.	Statistic	df	Sig.
How much would you be willing to pay for this bell pepper? Information : - Average price for one bell pepper = 20 cent - Willingness to pay in cen	,00	,212	96	,000	,902	96	,000
	1,00	,255	96	,000	,854	96	,000

a. Lilliefors Significance Correction

Purchase Intention → Shaprio-Will < 0,05 → test could not verify normal distribution → CLT

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Photos	Statistic	df	Sig.	Statistic	df	Sig.
Purchase_Intention	,00	,096	96	,029	,942	96	,000
	1,00	,172	96	,000	,880	96	,000

a. Lilliefors Significance Correction

Choice → Shaprio-Will < 0,05 → test could not verify normal distribution → CLT

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Photos	Statistic	df	Sig.	Statistic	df	Sig.
Choice_Ugly_Index	,00	,150	97	,000	,901	97	,000
	1,00	,132	96	,000	,931	96	,000

a. Lilliefors Significance Correction

Appendix 6.2.: One-way ANOVA Purchase Intention (Welch's ANOVA used because homogeneity of variances was not ensured because Leven's statistic, p < 0,05)

Descriptives

Purchase_Intention

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
,00	96	4,7292	1,68676	,17215	4,3874	5,0709	1,00	7,00
1,00	96	4,8229	1,98530	,20262	4,4207	5,2252	1,00	7,00
Total	192	4,7760	1,83786	,13264	4,5144	5,0377	1,00	7,00

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Purchase_Intention	Based on Mean	7,594	1	190	,006
	Based on Median	4,352	1	190	,038
	Based on Median and with adjusted df	4,352	1	187,174	,038
	Based on trimmed mean	6,735	1	190	,010

ANOVA

Purchase_Intention

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,422	1	,422	,124	,725
Within Groups	644,726	190	3,393		
Total	645,148	191			

Robust Tests of Equality of Means

Purchase_Intention

	Statistic[a]	df1	df2	Sig.
Welch	,124	1	185,169	,725

a. Asymptotically F distributed.

Appendix 6.3.: One-way ANOVA Willingness to Pay

Descriptives

How much would you be willing to pay for this bell pepper?

Information
: – Average price for one bell pepper = 20 cent – Willingness to pay in cen

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
,00	96	19,2396	10,86156	1,10855	17,0388	21,4403	,00	50,00
1,00	96	20,7292	11,35316	1,15873	18,4288	23,0295	,00	50,00
Total	192	19,9844	11,10609	,80151	18,4034	21,5653	,00	50,00

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
How much would you be willing to pay for this bell pepper? Information : – Average price for one bell pepper = 20 cent – Willingness to pay in cen	Based on Mean	,017	1	190	,896
	Based on Median	,013	1	190	,909
	Based on Median and with adjusted df	,013	1	188,251	,909
	Based on trimmed mean	,022	1	190	,881

ANOVA

How much would you be willing to pay for this bell pepper?

Information
: – Average price for one bell pepper = 20 cent – Willingness to pay in cen

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	106,505	1	106,505	,863	,354
Within Groups	23452,448	190	123,434		
Total	23558,953	191			

Appendix 6.4.: One-way ANOVA Willingness to Choose (Welch's ANOVA used because homogeneity of variances was not ensured because Leven's statistic, p < 0,05)

Descriptives

Choice_Ugly_Index

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
,00	97	,8247	,75963	,07713	,6716	,9778	,00	3,25
1,00	96	1,1380	,93250	,09517	,9491	1,3270	,00	4,00
Total	193	,9806	,86223	,06206	,8582	1,1030	,00	4,00

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Choice_Ugly_Index	Based on Mean	4,142	1	191	,043
	Based on Median	3,066	1	191	,082
	Based on Median and with adjusted df	3,066	1	178,988	,082
	Based on trimmed mean	3,812	1	191	,052

ANOVA

Choice_Ugly_Index

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,735	1	4,735	6,554	,011
Within Groups	138,004	191	,723		
Total	142,740	192			

Robust Tests of Equality of Means

Choice_Ugly_Index

	Statistic[a]	df1	df2	Sig.
Welch	6,540	1	182,754	,011

a. Asymptotically F distributed.

Appendix 7: One-way ANCOVAs

Appendix 7.1.: ANCOVA Choice

Estimated Marginal Means

Photos

Dependent Variable: choice

Photos	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
,00	,845[a]	,083	,682	1,008
1,00	1,117[a]	,083	,954	1,281

a. Covariates appearing in the model are evaluated at the following values: Environmental_concern = 5,8998, What is your sex? = 1,69, In which age group are you (years)? = 2,20, Awareness_food_waste = 5,4093, Corona = 4,3272, PANAS_positive = 4,2611, PANAS_negative = 2,0238.

Tests of Between-Subjects Effects

Dependent Variable: choice

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	21,691[a]	8	2,711	4,122	,000
Intercept	2,731	1	2,731	4,152	,043
Environmental_concern	3,290	1	3,290	5,001	,027
Gender	3,041	1	3,041	4,623	,033
Age	,204	1	,204	,311	,578
Awareness_food_waste	,996	1	,996	1,514	,220
Corona	5,217E-5	1	5,217E-5	,000	,993
PANAS_positive	2,152	1	2,152	3,272	,072
PANAS_negative	1,405	1	1,405	2,136	,146
Photos	3,549	1	3,549	5,395	,021
Error	121,048	184	,658		
Total	328,313	193			
Corrected Total	142,740	192			

a. R Squared = ,152 (Adjusted R Squared = ,115)

Appendix 7.2.: ANCOVA Purchase Intention

Estimated Marginal Means

Photos

Dependent Variable: Purchase_Intention

Photos	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
,00	4,778[a]	,174	4,435	5,122
1,00	4,774[a]	,174	4,431	5,117

a. Covariates appearing in the model are evaluated at the following values: Environmental_concern = 5,9045, What is your sex? = 1,69, In which age group are you (years)? = 2,20, Awareness_food_waste = 5,4045, Corona = 4,3362, PANAS_positive = 4,2604, PANAS_negative = 2,0208.

Tests of Between-Subjects Effects

Dependent Variable: Purchase_Intention

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	115,585[a]	8	14,448	4,993	,000
Intercept	,036	1	,036	,012	,912
Environmental_concern	9,717	1	9,717	3,358	,069
Gender	37,787	1	37,787	13,058	,000
Age	,232	1	,232	,080	,777
Awareness_food_waste	10,085	1	10,085	3,485	,064
Corona	,975	1	,975	,337	,562
PANAS_positive	8,810	1	8,810	3,044	,083
PANAS_negative	9,029	1	9,029	3,120	,079
Photos	,001	1	,001	,000	,985
Error	529,563	183	2,894		
Total	5024,778	192			
Corrected Total	645,148	191			

a. R Squared = ,179 (Adjusted R Squared = ,143)

Appendix 7.3.: ANCOVA Willingness to Pay

Estimated Marginal Means

Photos

Dependent Variable: How much would you be willing to pay for this bell pepper?

Photos	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
,00	19,383[a]	1,126	17,162	21,603
1,00	20,586[a]	1,126	18,365	22,807

a. Covariates appearing in the model are evaluated at the following values: Environmental_concern = 5,9045, What is your sex? = 1,69, In which age group are you (years)? = 2,20, Awareness_food_waste = 5,4045, Corona = 4,3362, PANAS_positive = 4,2604, PANAS_negative = 2,0208.

Tests of Between-Subjects Effects

Dependent Variable: How much would you be willing to pay for this bell pepper? Information: - Av

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1383,627[a]	8	172,953	1,427	,188
Intercept	27,097	1	27,097	,224	,637
Environmental_concern	45,606	1	45,606	,376	,540
Gender	402,408	1	402,408	3,321	,070
Age	179,296	1	179,296	1,480	,225
Awareness_food_waste	32,073	1	32,073	,265	,608
Corona	,618	1	,618	,005	,943
PANAS_positive	209,187	1	209,187	1,726	,191
PANAS_negative	2,075	1	2,075	,017	,896
Photos	69,015	1	69,015	,570	,451
Error	22175,326	183	121,177		
Total	100239,000	192			
Corrected Total	23558,953	191			

a. R Squared = ,059 (Adjusted R Squared = ,018)

Appendix 8: Serial Mediation Model (Model 4; Hayes 2013) Statistical Output

Appendix 8.1.: Mediation Analysis with *importance of hedonic benefits* as mediator

```
**************************************************************************
OUTCOME VARIABLE:
 HEDON

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      ,0452      ,0020     1,2863      ,3916     1,0000   191,0000      ,5322

Model
             coeff         se          t          p       LLCI       ULCI
constant    4,8574      ,1152   42,1816      ,0000     4,6303     5,0845
Photos      -,1022      ,1633     -,6258     ,5322     -,4242      ,2199

**************************************************************************
OUTCOME VARIABLE:
 Choicewl

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      ,1857      ,0345      ,7253     3,3946     2,0000   190,0000      ,0356

Model
             coeff         se          t          p       LLCI       ULCI
constant     ,6899      ,2777     2,4841      ,0139      ,1421     1,2378
Photos       ,3161      ,1227     2,5756      ,0108      ,0740      ,5582
HEDON        ,0278      ,0543      ,5108      ,6101     -,0794      ,1349
```

```
*************** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y ***************

Total effect of X on Y
     Effect         se          t          p       LLCI       ULCI       c_ps
      ,3133      ,1224     2,5600      ,0112      ,0719      ,5547      ,3633

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI      c'_ps
      ,3161      ,1227     2,5756      ,0108      ,0740      ,5582      ,3666

Indirect effect(s) of X on Y:
          Effect     BootSE   BootLLCI   BootULCI
HEDON     -,0028      ,0102     -,0235      ,0204

Partially standardized indirect effect(s) of X on Y:
          Effect     BootSE   BootLLCI   BootULCI
HEDON     -,0033      ,0118     -,0276      ,0235
```

Appendix 8.2.: Mediation Analysis with *importance of utilitarian benefits* as mediator

```
**************************************************************************
OUTCOME VARIABLE:
 Utilit

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      ,0117      ,0001     1,0448      ,0261     1,0000   191,0000      ,8719

Model
             coeff         se          t          p       LLCI       ULCI
constant    5,7182      ,1038    55,0972      ,0000     5,5135     5,9229
Photos      -,0238      ,1472     -,1615      ,8719     -,3140      ,2665

**************************************************************************
OUTCOME VARIABLE:
 Choicewl

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      ,3041      ,0925      ,6818     9,6777     2,0000   190,0000      ,0001

Model
             coeff         se          t          p       LLCI       ULCI
constant    -,3527      ,3446    -1,0236      ,3073    -1,0324      ,3270
Photos       ,3182      ,1189     2,6764      ,0081      ,0837      ,5527
Utilit       ,2059      ,0585     3,5228      ,0005      ,0906      ,3212

*************** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y ***************

Total effect of X on Y
     Effect         se          t          p       LLCI       ULCI       c_ps
      ,3133      ,1224     2,5600      ,0112      ,0719      ,5547      ,3633

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI      c'_ps
      ,3182      ,1189     2,6764      ,0081      ,0837      ,5527      ,3690

Indirect effect(s) of X on Y:
            Effect     BootSE   BootLLCI   BootULCI
Utilit      -,0049      ,0308     -,0622      ,0618

Partially standardized indirect effect(s) of X on Y:
            Effect     BootSE   BootLLCI   BootULCI
Utilit      -,0057      ,0358     -,0719      ,0709
```

Appendix 8.3.: Mediation Analysis *net importance utilitarian benefits* as mediator

```
**************************************************************************
OUTCOME VARIABLE:
 Uti_Hed

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      ,0318      ,0010     1,5323      ,1936     1,0000   191,0000      ,6604

Model
              coeff         se          t          p       LLCI       ULCI
constant      ,8608      ,1257     6,8490      ,0000      ,6129     1,1087
Photos        ,0784      ,1782      ,4400      ,6604     -,2731      ,4299

**************************************************************************
OUTCOME VARIABLE:
 Choicewl

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      ,2476      ,0613      ,7052     6,2029     2,0000   190,0000      ,0025

Model
              coeff         se          t          p       LLCI       ULCI
constant      ,7239      ,0952     7,6074      ,0000      ,5362      ,9116
Photos        ,3041      ,1210     2,5140      ,0128      ,0655      ,5427
Uti_Hed       ,1171      ,0491     2,3856      ,0180      ,0203      ,2139
```

```
************** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y **************

Total effect of X on Y
     Effect         se          t          p       LLCI       ULCI       c_ps
      ,3133      ,1224     2,5600      ,0112      ,0719      ,5547      ,3633

Direct effect of X on Y
     Effect         se          t          p       LLCI       ULCI      c'_ps
      ,3041      ,1210     2,5140      ,0128      ,0655      ,5427      ,3527

Indirect effect(s) of X on Y:
            Effect     BootSE   BootLLCI   BootULCI
Uti_Hed      ,0092      ,0235     -,0287      ,0655

Partially standardized indirect effect(s) of X on Y:
            Effect     BootSE   BootLLCI   BootULCI
Uti_Hed      ,0106      ,0271     -,0327      ,0752
```

Appendix 9: One-way ANOVA of gender and willingness to choose, purchase and pay

Oneway

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Choice_Ugly_Index	Male	59	,6949	,78106	,10169	,4914	,8985	,00	4,00
	Female	134	1,1063	,86894	,07506	,9579	1,2548	,00	3,25
	Total	193	,9806	,86223	,06206	,8582	1,1030	,00	4,00
Purchase_Intention	Male	59	3,9209	1,89103	,24619	3,4281	4,4137	1,00	7,00
	Female	133	5,1554	1,68652	,14624	4,8661	5,4447	1,00	7,00
	Total	192	4,7760	1,83786	,13264	4,5144	5,0377	1,00	7,00
How much would you be willing to pay for this bell pepper? Information : - Average price for one bell pepper = 20 cent - Willingness to pay in cen	Male	59	17,1864	9,73347	1,26719	14,6499	19,7230	,00	50,00
	Female	133	21,2256	11,48030	,99547	19,2564	23,1947	,00	50,00
	Total	192	19,9844	11,10609	,80151	18,4034	21,5653	,00	50,00

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Choice_Ugly_Index	Based on Mean	1,926	1	191	,167
	Based on Median	2,354	1	191	,127
	Based on Median and with adjusted df	2,354	1	190,064	,127
	Based on trimmed mean	2,105	1	191	,148
Purchase_Intention	Based on Mean	2,630	1	190	,107
	Based on Median	2,851	1	190	,093
	Based on Median and with adjusted df	2,851	1	189,617	,093
	Based on trimmed mean	2,799	1	190	,096
How much would you be willing to pay for this bell pepper? Information : - Average price for one bell pepper = 20 cent - Willingness to pay in cen	Based on Mean	,949	1	190	,331
	Based on Median	,313	1	190	,577
	Based on Median and with adjusted df	,313	1	185,262	,577
	Based on trimmed mean	,598	1	190	,440

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Choice_Ugly_Index	Between Groups	6,934	1	6,934	9,752	,002
	Within Groups	135,806	191	,711		
	Total	142,740	192			
Purchase_Intention	Between Groups	62,284	1	62,284	20,303	,000
	Within Groups	582,864	190	3,068		
	Total	645,148	191			
How much would you be willing to pay for this bell pepper? Information : – Average price for one bell pepper = 20 cent – Willingness to pay in cen	Between Groups	666,771	1	666,771	5,534	,020
	Within Groups	22892,182	190	120,485		
	Total	23558,953	191			

Appendix 10: One-way ANOVA with Germany/Other countries and willingness to choose ugly food

Descriptives

Choice_Ugly_Index

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
,00	29	,9052	,87987	,16339	,5705	1,2399	,00	3,25
1,00	164	,9939	,86112	,06724	,8611	1,1267	,00	4,00
Total	193	,9806	,86223	,06206	,8582	1,1030	,00	4,00

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Choice_Ugly_Index	Based on Mean	,037	1	191	,848
	Based on Median	,119	1	191	,730
	Based on Median and with adjusted df	,119	1	187,820	,730
	Based on trimmed mean	,078	1	191	,780

ANOVA

Choice_Ugly_Index

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,194	1	,194	,260	,611
Within Groups	142,546	191	,746		
Total	142,740	192			

Robust Tests of Equality of Means

Choice_Ugly_Index

	Statistic[a]	df1	df2	Sig.
Welch	,252	1	38,100	,618

a. Asymptotically F distributed.

Appendix 11: One-way ANOVA willingness to choose without lemons

Descriptives

Choice_without_lemon

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
,00	97	,7354	,82907	,08418	,5683	,9025	,00	3,67
1,00	96	1,1007	,98304	,10033	,9015	1,2999	,00	4,00
Total	193	,9171	,92486	,06657	,7858	1,0484	,00	4,00

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Choice_without_lemon	Based on Mean	4,090	1	191	,045
	Based on Median	3,269	1	191	,072
	Based on Median and with adjusted df	3,269	1	182,146	,072
	Based on trimmed mean	4,069	1	191	,045

ANOVA

Choice_without_lemon

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6,438	1	6,438	7,794	,006
Within Groups	157,791	191	,826		
Total	164,229	192			

Robust Tests of Equality of Means

Choice_without_lemon

	Statistic[a]	df1	df2	Sig.
Welch	7,780	1	185,071	,006

a. Asymptotically F distributed.

Appendix 12: Linear regression analysis: Environmental concern → Choice

Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Env_c[b]	.	Enter

a. Dependent Variable: choice

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,247[a]	,061	,056	,83765

a. Predictors: (Constant), Env_c

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8,722	1	8,722	12,431	,001[b]
	Residual	134,017	191	,702		
	Total	142,740	192			

a. Dependent Variable: choice

b. Predictors: (Constant), Env_c

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-,258	,356		-,724	,470
	Env_c	,210	,060	,247	3,526	,001

a. Dependent Variable: choice