Erasmus School of Economics

Master Thesis [MSc Behavioural Economics]

"Can guided choices lead to preference change? Exploring the Implicit Choice Paradigm in a consumer choice context"

By Maria Michalitsi

Student number: 469457

Supervisor: Dr. Georg Đura Granić

Second Assessor: Timo Lambregts

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ABSTRACT

In this thesis, the effect of choices on preferences is discussed and tested for, with a small scale experiment. A strong body of evidence supports the idea that the choices people make, sometimes feed back into their preferences, altering them. As a result, chosen options are valued higher, and rejected options lower than before the choice was made. However, in economic theory, choices are still commonly considered as mere manifestations of one's preferences, and the effect of choices on preferences is often disregarded. In the following chapters the existing literature from multiple disciplines exploring the causes, triggers and ways to detect choice-induced preference change is thoroughly discussed. After reviewing past experimental studies and addressing the criticism on the theory and methods used, the Implicit Choice Paradigm by Alós Ferrer et al is chosen to set up a small scale experiment that resembles a consumer-choice setting using real rewards. The study's results did not reveal significant choice-induced preference change. However, a few interesting outcomes occurred, regarding different treatment groups and the respondents' behavior.

Keywords: choice-induced preference change, Implicit Choice Paradigm, real rewards, Cognitive Dissonance

PREFACE

I chose to study behavioral economics because I always felt like something was missing from the way neoclassical Economics view human behavior. During my Bachelor, I spent a lot of time learning about economic models and memorizing axioms about rational economic behavior that were blatantly far from reality. Behavioral economics is a complicated, ambiguous science that tries to peek into the reality of human behavior, considering more and more factors and elements that drive the behavior of real people. Just like human behavior is messy, ambiguous and multi-dimensional.

Therefore for my thesis, I wanted to look into yet another layer of human behavior that should be taken into consideration when trying to predict economic decisions, and provide more evidence for it, with a simple experimental design.

I would like to thank the numerous people that helped the realization of this project. Many thanks to my supervisor Dr. Granić for his valuable feedback and guidance during this journey. He provided me with freedom and nudged me to be creative and take initiatives for my thesis.

I would like to especially thank my father for giving me the opportunity to pursue my Master studies abroad, supporting my decisions and funding my life in the Netherlands. My parents' faith and trust in me and my abilities have armed me with strength and confidence to become the best version of myself.

Lastly, I would like to thank my three sisters, my wonderful partner and the very close friends that have been supporting me all the way from Greece, as well as the amazing people that I met in the Netherlands and made me feel at home right from the start.

When one has such a concrete network of strong, supportive and encouraging people, it is impossible to fail. Thank you all for making me feel lucky and blessed every single day.

CONTENTS

1. INTRODUCTION

Traditionally in Economics, preferences have been considered to be reflected by one's choices and decisions. However, evidence from various disciplines shows that choices can sometimes alter preferences too. Through the history of economics, mental processes and motivations driving the observed behavior were seldom explored, and the interaction between preferences and behavior was usually simplified to a one-way "choices depend on preferences" relationship. Economists still derive preferences based on observed behavior, in an ex-post elicitation, and model preferences based on past decisions, assuming that people are according to what they like, revealing their underlying preferences as they evaluate outcomes and make choices. While this approach may suffice for many applications of economic behavior models, problems start to arise when one tries to understand how to trigger or influence preferences and behavior (Akerlof & Dickens, 1982). Looking a bit deeper into the causal relationship between preferences and choices, one quickly finds evidence that, in many cases, choices may not only reflect preferences, and can create or alter them. Many studies attest that when an individual makes a choice between two similarly preferable options, their preference for the chosen option will increase, while their preference for the unchosen option will decrease, as a result of the choice (for a review see Grüne-Yanoff et al., 2009), and this effect can be long-lasting (Sharot et al., 2012). As behavioural economists strive to improve predictive models and find ways to influence and guide behavior, it is crucial to understand how to accurately detect and measure the effect of choices on preferences and find out how it is triggered. Luckily, social psychologists have long been studying the effects of choices on beliefs, providing other sciences such as economics and neuroscience with a rich methodological and theoretical framework to make use of.

Due to the many differences in how different disciplines approach, define and study behavior, there has been an increasing number of economic studies trying to adapt, replicate and measure findings and theories from social psychology in an economic context. Despite the growing interest on the subject, the two-way interaction between choices and preferences is still often disregarded in economic literature as a social rather than an economic phenomenon. With major implications for economic theory and modeling economic behavior (Norton & Ariely 2008), the effect of behavior on preferences remains vague and not sufficiently specified in an economic

context, while the underlying causes of the observed effects are debatable, raising the necessity for more research on the subject.

Ever since choice-induced attitude change was observed, social psychologists have been theorizing about the underlying mechanisms that drive it. If one makes a choice, their beliefs are often observed to shift in the direction of their choice, but what is the reason for this? The most popular explanation comes in the form of the Cognitive Dissonance theory, developed by Leon Festinger (Festinger, 1957). One of his most popular studies showcasing its effects was the case of the believers of a religious cult, who believed in and lived by an imminent doomsday prophecy. Festinger's team infiltrated the cult and observed that, when the world did not end as expected, the members who had even left their jobs and changed their lives due to the prophecy, preferred to claim divine intervention rather than admit that the prophecy was invalid and their actions were misled (Festinger et al, 1956), (Brehm, 2007). People hold cognitions, defined by Festinger as opinions based on knowledge about themselves and their surroundings (Festinger 1957). When their actions contradict what they believe about themselves, a state of dissonance is generated and the more contradicting the new information with their existing cognitions, the more intense the dissonance state. In an attempt to relieve the tension created by this state, people alter their cognitions (preferences, attitudes, beliefs), as they have no way of taking back their actions (Festinger, 1957). So like in the case of the cult's members, we want to believe that we are intelligent and logical beings that make well-justified decisions, especially when those decisions are costly. When we get called out to answer for an action that is not in line with logic or previously stated preferences, Cognitive Dissonance is created, leading us to either try to distort logic or change our stated preferences.

The most popular method to detect and measure choice-induced preference change is the Free Choice Paradigm (FCP), developed by Jack Brehm in 1956 as a simple experimental design to explore Cognitive Dissonance theory in a lab. Triggered by the work of Festinger and his predecessors, Brehm developed a straightforward design with a three-step core structure. In his experiments, college students evaluated objects on a scale, made choices between similarly valued objects and were then asked to repeat the evaluation. The results from these studies showed a significant post choice evaluation change and triggered a series of experiments in various settings. (Among others: Steele et al., 1993; Heine and Lehman, 1997; Lieberman et al.,

2001; Gerard & White, 1983). In addition, the Free Choice Paradigm made the theory of choice-induced preference change more relevant for economics, providing a simple design to explore the effect of economic decisions on preferences in controlled experiments.

While the theory of Cognitive Dissonance and the Free Choice Paradigm have been very popular through the last 60 years, with significant results found in numerous experimental FCP studies, in recent years the methodology and underlying theory of those studies have been severely criticized. Researchers have provided strong arguments challenging the validity of these findings and the theoretical background used, by identifying flaws in the methodology and proposing different explanations for significant effects found (Chen & Risen, 2010; Izuma & Murayama, 2013).

The purpose of this thesis is to set up a small-scale experiment in a consumer choice-like context, to trigger and analyze choice-induced preference change, after reviewing and discussing the literature and approaches used by past studies. In the following chapters, the background, advantages, controversies and flaws of the FCP are discussed, as well as the strategies proposed to deal with its significant shortcomings. The Implicit Choice Paradigm (ICP) (Alós-Ferrer et al, 2012) alternative of the FCP is selected as the most appropriate design to set up a simple, easy to recreate economic experiment resembling a real-life consumer choice situation while avoiding the pitfalls of the initial design. In the case of the ICP, the subject is never asked to directly choose between the two potions of interest but is instead presented with two choice pairs, were the options of interest are paired with strictly dominant or dominated options, thus constructing the familiar (chosen, unchosen) pair in an indirect way. Finally, a detailed description of the experimental part of the thesis is provided, followed by a review of the results and possible uses of for future research as well as possible practical application.

In addition to the value of this subject for economic research and academics, developing a design to accurately explain, trigger and measure choice-induced preference change could have many practical uses for understanding and guiding behavior. An adaptation of the ICP design to simulate a real-life situation while avoiding the flaws of the original design could serve as a useful tool for both behavioral economists developing "nudges" and marketers looking to influence consumer behavior.

2. LITERATURE REVIEW

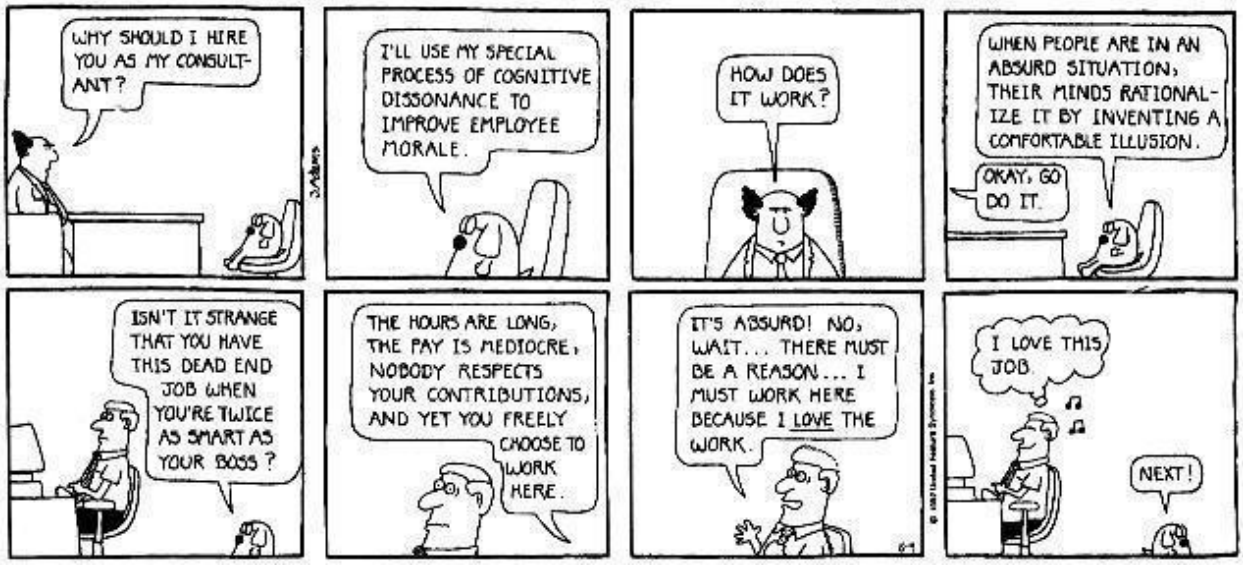
2.1 Different approaches for preferences and the need for interaction

While the interaction between disciplines is undoubtedly of great value, it can be tricky to incorporate theory from social psychology into economics, due to the different approaches of the fields regarding human preferences and behavior. In Economics, preferences are strictly defined and based on a set of assumptions of rational behavior, for researchers to be able to quantify them, model them and obtain tangible predictions for future behavior. It is one of those core assumptions, the "choices depend on preferences" assumption, that was proved to be problematic thus raising the need for this interdisciplinary exchange. Social psychologists, on the other side, with a history rich in empirical evidence from field data and social experiments on irrational human behavior, claim that one's stated beliefs and preferences are sometimes shaped and changed to match their actions. While they also use preference models, preferences are viewed as vaguer and very volatile (Norton & Ariely 2008). In the next parts, past research from multiple disciplines that exploring and discussing the core concepts surrounding choice-induced preference change.

2.2 Cognitive Dissonance Theory: I chose it, so I must like it.

Cognitive Dissonance has been universally used to explain the causes of choice-induced preference change. According to the theory of Cognitive Dissonance (Festinger, 1957), in order to relieve the mental discomfort created from discrepancies between our beliefs and the decisions we make, we often change our beliefs ad-hoc. People want to feel like they are acting on their own free will and will not easily be manipulated or influenced by circumstances. However, it often happens that choices are made without careful thought or are driven by external stimuli. Cognitive Dissonance is usually triggered when one is asked to reflect on those choices and explain his or her reasoning. The discomfort of being in the unpleasant state of Cognitive Dissonance when trying to justify a choice that is not consistent with your stated preferences or tastes leads one to subconsciously try to eliminate the gap between behavior and belief. As past actions cannot be undone, people tend to alter their opinions in an attempt to bring them closer to their actions. (Gawronski et al, 2007) They come up with justifications of their actions, and in many cases will defend them even if they were unconsciously manipulated into making them (for

an example see. It is an unconscious process that can also be seen as "self-delusion" (Tierney, 2007), as a decision maker tricks himself into liking something, in an attempt to justify his decisions (for a funny yet accurate see comic below).



Dilbert Comic by Adams S., 1992

This idea, and some deriving predictions, have since incited more than 2,000 studies (Cooper 1999) to explain how people often change their beliefs after they are pushed, tricked or forced into making decisions that contradict their optimal course of action. The theory of Cognitive Dissonance has since been employed by many sciences to explicate different aspects of human behavior, from ideology changes studied in political science (Acharya et al, 2018) to smokers turning a blind eye to evidence about the harmful effects of smoking in preventive medicine (Kassarjian & Cohen, 1965). Many studies have looked into the duration of the effects of Cognitive Dissonance on preferences using different paradigms. In some cases, the effects are found to be long-lasting (Axsom & Cooper, 1980), and can even lead to the creation of false memories (Rodriguez & Strange, 2014).

In Economics, Cognitive Dissonance theory is often used to provide sufficient explanation for observed cases of preference changes (Grüne-Yanoff & Hansson, 2009), irrational economic behavior by experienced economic agents (Gilad et al, 1987), not buying flood and fire insurance in high risk areas (Kunreuther et al., 1978) and many other cases of people coming up with

justifications for their seemingly irrational behavior. Aiming to further explicate how cognitive dissonance works in economic terms, authors Akerlof and Dickens propose a cost-benefit approach, which occurs unconsciously in the mind of the choice-maker (Akerlof & Dickens, 1982). Studying people who work in high-risk jobs, the authors build a decision model based on choice of beliefs. Believing that their job is safe yield a benefit for the workers, in the sense that they can be happier and more carefree in their job and avoid being constantly stressed about the risks. However, choosing to disregard evidence of how dangerous the job is also incurring a cost to the worker, who is at risk of making significant judgment errors (such as not buying safety equipment) due to his belief that the job is safe. One could argue that the same logic is directly applicable for choice-makers who deal with high-risk economic decisions, as well as a variety of cases where this approach could be used to explain why cognitive dissonance occurs, as well as why it may not take over.

2.3 Studying choice-induced preference change: The Free Choice Paradigm

The Free Choice Paradigm is introduced for the first time in 1956, when Jack Brehm, Festinger's student, brought his wedding gifts into the lab and set up the first FCP experiment exploring post-choice preference change (Tierney, 2007). In his experiments, Brehm asked university students to rank, rate and choose between similar objects (e.g. appliances, posters) based on their preferences. Subjects were presented with a homogeneous set of objects and asked to evaluate each one on a scale. They were then asked to choose one of two similarly valued items to take home. In the end, subjects had to repeat the evaluation process. In early FCP experiments, participants were often led to believe that they can take their chosen item home, increasing the feeling of ownership for their chosen object and tangibility of the reward. Brehm found that subjects tended to evaluate the item they chose significantly higher in the second evaluation task compared to their initial evaluation, while the opposite happened for the option that did not get chosen in the choice task. Preference for the chosen item rose, while the attractiveness of the rejected option declined. This phenomenon was named "positive spreading of alternatives", and was interpreted as the result of Cognitive Dissonance created by the act of choice on preferences. Thus Brehm declared his conclusions about Cognitive Dissonance having an effect on beliefs, attracting a multidisciplinary interest that triggered a large number of studies replicating his design, from neuroscience to economics, and lasted several decades. Many studies have since

managed to demonstrate a positive spreading of alternatives in different contexts, (e.g. Coppin et al 2010; Gerard et al 1983; Sharot et al 2009; Lieberman et al, 2001; Egan et al, 2010) with samples varying from young children to amnesia patients and capuchin monkeys. In Brehm's prototype and the similar studies that followed, the most common way of recording preferences was to ask subjects to rank or rate the objects in question (Brehm, 1956 and others), while in some cases, in neuroscience studies make use of methods as sophisticated as fMRI (functional magnetic resonance imaging) to see how the brain responds to stimuli during an FCP study (Sharot et al, 2009; K. Izuma, 2010 and others).

2.4 A critical view of the FCP

After a few decades of studies following Brehm's initial experimental design without significant deviations, some researchers began pointing out crucial flaws in the design, challenging the validity of Brehm's findings as well as those of the studies that followed. A paper by Keith Chen in 2008, and the follow-up paper in 2010 by Chen and Risen, revealed critical flaws in the logic and methodology used in FCP studies. The main problem that Chen and Risen identified in the FCP design stems from an erroneous assumption, that one's preferences are perfectly demonstrated by their initial ratings and rankings. This has many implications for the methodology and the interpretation of the results of past studies following this design, as well as the use of the paradigm for future research (Izuma & Murayama 2010).

A major problem created by said assumption is that, in Brehm's experiment and many others, if a subject makes a choice that is not consistent with their initial ranking or rating of alternatives, they are dropped from the sample. However, critics argue that if a person ranks (A) over (B), but still chooses (B) over (A), which could just mean that they are somewhat indifferent between the two, and the act of choosing revealed some new information. Chen and Risen state that, by dropping around 20% of the participants on the basis of preference reversal, Brehm and his successors have inflicted a major selection bias on their results. Chen argues that the initial evaluation of choices (ranking or rating) is usually an incomplete representation of the participant's preferences, and as subjects make choices, they learn new information about their tastes and update their preferences accordingly. Therefore, we should expect a higher valuation of chosen options after choice, regardless of Cognitive Dissonance.

In 2010, Chen and Risen presented formal mathematical proof for the criticism. Based on three assumptions, they demonstrate that the FCP will measure a positive spreading of alternatives, even if people have perfectly stable preferences. Therefore, they suggest that the positive spreading measured in past FCP studies would also occur without the act of choice.

Alós-Ferrer and Shi responded to this point of criticism by presenting a decision-making model that does not always yield positive spread. The model satisfied all three assumptions in Chen and Risen's article and thus provided evidence that "spreading needs not be positive in the absence of choice-induced preference change". Therefore, while the FCP is not perfect, the results from past studies that followed this design are still informative and should not be disregarded (Alós-Ferrer & Shi, 2015).

Another aspect of the criticism pointed out by Chen and Risen, is that many FCP studies suffer from self-selection bias for spread. In many FCP studies, a control group of subjects who are asked to complete the evaluation tasks without having to make choices in between is used as a baseline. This poses a problem as, while in the treatment group people that make choices inconsistent with their initial preferences are dropped from the study, the control group is made up of all subjects, violating the assumption that a control group must react to the treatment similar to the treatment group, and resulting in participants 'self-selecting' how chosen spread is calculated.

"Self-selection" also leads to another point of criticism that is referred to as "The Problem for Studying Moderators and Mediators in the FCP" (Chen, 2008; Chen & Risen, 2010). It is argued that the problem of self-selection particularly affects the numerous studies that explore the effects of moderator and mediator variables (e.g. culture differences, distance of options). It is hence possible that the difference in spreading for different values of the moderating variable is a result of the noisy evaluation rather than different preferences.

2.5 Self-Perception Theory: If I chose it, it must be better.

Chen and Risen argue that, if one chooses different items because they have different underlying preferences for the two items, then it is unclear whether the documented effects in the FCP are the result of preference change following choice or, a reflection of existing preferences that are

revealed by choice. Rather than accepting Cognitive Dissonance as the cause of positive spreading of alternatives in FCP experiments, Chen invites researchers to consider an alternative explanation, namely the Theory of Self Perception, introduced by D.J.Bem in 1967. In the respective paper, Bem views the subject as an actor and an observer at the same time. When a subject is unfamiliar with the different options presented and therefore has vague and ambiguous preferences, making a choice provides new information and reduces ambiguity. In the same way that when one is unsure about the value of a number of objects, observing someone else making a choice between them is used as evidence in favor of the chosen option The same occurs when the observer and the decision maker is the same person. Izuma and Murayama in their 2013 review of the FCP's shortcomings, highlight that having subjects choose directly between the two median ranked options of interest, as in Brehm's design, is problematic in the sense that this choice may lead them to think about the two objects more carefully and reveal new information about the decision makers' preferences. An experimental study by Fazio, Zanna, and Cooper in 1977 showcased how Cognitive Dissonance and Self Perception can simultaneously influence beliefs, depending on the certainty of the subject about their initial evaluation.

The pivotal difference that sets Cognitive Dissonance apart from other theories that may result in post choice preference change, such as Self Perception Theory, is that Cognitive Dissonance is a driver of behavior in itself, motivating individuals to shift their beliefs in a specific direction. In other theories that predict the same outcomes, the effect is a result of external factors, such as new information. (Kenworthy et al, 2011).

Although many studies following the publication of Chen and Risen's paper in 2010, attempted to address the criticism, there have been studies following Brehm's design disregarding the highlighted problems (Izuma & Murayama, 2013)

2.6 Strategies for addressing the criticism of the FCP Design

In order to address the criticism, a few alternative designs have been developed to detect choice-induced preference change while dealing with the FCP criticism. These studies aimed to strip the information from the act of choice and avoid the possibility of subjects changing their evaluations due to preference learning. While all of the proposed designs have been tested and yielded significant positive spreading of alternatives (Izuma, Murayama, 2010; Sharot et al,

2010b; Alós-Ferrer et al, 2012), there has been criticism (Izuma, Murayama, 2013) on these designs as well.

In their paper, Chen and Risen proposed an alteration to Brehm's design, by controlling for information revealed by choice. In addition to Brehm's Rate-Choose-Rate design, the authors propose to include an additional condition in the study, in which subjects would respond to identical tasks but in a different order (Rate-Rate-Choose), thus making sure that there is no chance of choice-induced preference change between ratings. The spreads from the two conditions should then be compared to one another, ensuring that there is no selection bias, and the effect of choice is isolated. A significantly larger spread in the RCR condition would mean that choice-induced preference change is detected. A major drawback of this design is the need for an additional treatment group, which can be costly in capital, time and labor for researchers.

A second way to deal with the effect of information revealed by choice is a blind-choice design (Chen, Risen, 2010; Sharot et al, 2010b). This variation follows Brehm's conventional structure, with the difference that, in the choice task, the choice is made by the experimenter (or at random). In a study by Sharot et al, for the choice task, participants could only see the options for a split second before choosing, so that they had no way of knowing what they chose (in reality the available options were a string of incomprehensible characters anyway), and were afterwards informed of their choice (which was not made by them). The spread was then calculated in the conventional way to see if the choice subjects thought they made would have an effect on preferences. This design deals with the criticism on the FCP by ensuring that no new information about a person's underlying choices is revealed by the act of choice, and eliminating selection bias. However, subjects are stripped from free choice and purposely mislead to think that the choices were their made by them so that choices do not depend on the subjects' preferences.

The last variation designed to deal with the criticism of the conventional FCP discussed in this thesis is the Implicit Choice Paradigm. (Alós-Ferrer, 2012; Alós-Ferrer & Granić, 2018) This design also maintains Brehm's structure, but in this case, the choice pair of interest is composed of two successive implicit choice tasks. For this, the two similarly evaluated ranked choices are never placed in direct comparison, but instead two choice pairs are formed, each of them

containing one of the two options in question (chosen, unchosen), paired with a significantly lower and higher ranked option respectively. This way, the authors lead participants into accepting one of the median options and rejecting the other, without putting the two options in a straight confrontation. This design deals with the criticism on the conventional FCP by eliminating selection bias, while still letting subjects make their own choices (Alós Ferrer et al, 2012). While the choice makers are directed towards an option by pairing it with a strictly dominated one, they can still defy this direction and demonstrate preference reversal, which might as well provide the researchers with interesting findings. However, as this design lets subjects make their own choices, critics argue that it suffers from the same selection bias identified in the traditional FCP, to a certain extent (Izuma & Murayama, 2013), in the sense that the implicit choice tasks may still reveal information about one's preferences of the choice pair of interest. The authors of the design have addressed this argument by introducing an ad-hoc correction to the results of ICP studies, in the form of a robustness check, were all participants are includes and the spreads are recalculated as if everyone as the experiment implicitly directed them to (always choose the strictly dominant choice from the first evaluation). This way, selection bias is eliminated, and choice-induced preference change can be demonstrated, provided that both analyses provide evidence of significantly positive spread (Alós Ferrer et al, 2012).

3. EXPERIMENTAL DESIGN

3.1 An Implicit Choice design

While all of the aforementioned strategies to improve the classical FCP are notable and worthy of further attention and research, in this case, the Implicit Choice Paradigm best fits the research questions of the thesis, while respecting the study's capital and time constraints. An ICP experiment was thus set up, building on the design by Alós-Ferrer et al, to try and replicate significant choice-induced preference change in a consumer choice-like setting.

A framed field experiment was set up, where volunteers were asked to rank and choose between soft drinks. The study follows a within-subject, one-shot design, with interposing filler tasks to prevent memory effects from initial to post choice evaluation. The experiment was designed to satisfy Smith's 5 percepts: Non-satiation, Saliency, Dominance, Privacy, and Parallelism (Smith 1982), in order to ensure control over preferences and obtain honest, relevant and well-thought responses. The 5 precepts will be explained and discussed in detail as the different aspects of the experiment are introduced.

For this ICP experiment, the data collection followed the paradigm's typical 3-step process: initial evaluation - choice task(s) – final evaluation. The preferences of the participants before and after choice were derived from the evaluation tasks, where subjects were asked to rank 9 soft drinks from most preferable (rank 1) to least preferable (rank 9).

The 5^{th} and 6^{th} rank were chosen as options interest, assuming that subjects will have strong preferences for the drinks that they ranked in extreme places, but not so much for the ones they ranked in the middle, making them fairly indifferent between those. These options were thus thought to create more cognitive dissonance, as the harder and less obvious a choice is, the more dissonance it is likely to create (Izuma et al, 2010). Participants were familiar with the products used in the study, as confirmed by their responses to qualitative controls at the end of the experiment.

The choice of interest (chosen, unchosen) was between two medianly ranked options (rank 5, rank 6), and implicitly constructed from 2 implicit choice tasks for each participant as follows: First, a random process determined one of the medianly ranked options (rank 5, rank 6) "to be

chosen", and the other one "not to be chosen". Then two choice pairs were constructed, one with the option "to be chosen" paired with a strictly dominated option (ranked two places lower in the initial evaluation), and the other containing the "not to be chosen" option paired with a strictly dominant one (ranked two places higher in the initial evaluation). Thus the subjects were allocated to two conditions, as shown in Table 1.

Table 1: ICP treatments

A. Treatment 1 (Congruent) : Rank 5 "to be chosen"		B. Treatment 2 (Incongruent) : Rank 6 "to be chosen"	
ICP 1.1:	(Rank 5) or (Rank 7)	ICP 2.1:	(Rank 6) or (Rank 8)
ICP 1.2:	(Rank 6) or (Rank 4)	ICP 2.2:	(Rank 5) or (Rank 3)

The allocation of subjects to treatments was randomized. Subjects allocated to treatment T1 were presented with two implicit choice pairs formed to increase the valuation of the higher ranked drink and lower the valuation of the one ranked lower in line with their initial valuation of the direct pair (5 chosen, 6 not chosen), thus T1 is considered as congruent. On the other hand, treatment T2 aims to increase the valuation of the lower ranked drink of the direct pair and devalue the higher ranked one, attempting to reverse the hierarchy of the first ranking, so it will be called incongruent.

For the present study, a positive spreading of alternatives will provide evidence of the existence of choice-induced attitude change. The spread between the two evaluations will be calculated as the 2012 paper by Alós Ferrer et al and will be explained in detail in the following parts.

Having two treatment conditions (either one of rank 5, rank 6 can be determined as "to be chosen" serves to eliminate statistical bias that could be caused by naturally occurring positive spreading of alternatives (Chen and Risen 2010). While it could be that positive spreading of alternatives will occur regardless of whether the person makes a choice in the case of the first treatment, one could argue that the second treatment deals with this problem, since the expected effect of the opposite direction of the spreading that the critics have found to naturally occur.

Moreover, it lets us test preference change in both directions, and see if the ICP design can also lead to preference reversals.

In order to avoid memory effects from the initial to the final evaluation, two filler tasks were introduced after the initial evaluation (right before the choice tasks, see Appendix B). Those tasks have had the form of easy brain-teasers and involved counting and visual stimuli, in view of distracting the responders. To further ensure that subjects don't repeat the same evaluations from memory, it was made clear in the instructions that the experiment did not involve any memory tasks.

3.2 Towards a consumer choice setting

A major novelty the present study brings to Implicit Choice Paradigm and preceding literature is the proximity of the experiment to a real-life economic situation, thus providing evidence to support the assumption of Parallelism in this study (Smith, 1982). In essence, this assumption means that subjects will behave in the lab just like they would in a non-experimental context. In the present case, the study takes place out of the lab. However, although it is still a controlled experiment, and Parallelism is succeeded through the choice of products and rewards system so that it is safe to assume consumers would behave and change their preferences in a similar way if they encountered the same choices in a real-life situation (e.g. in a shop or online shop).

Instead of using posters, holiday destinations and other hypothetical objects typically used in psychological cognitive FCP studies, in this experiment the objects used are low-cost everyday consumer products. This enabled the researcher to fully incentivizing each task (incentives plan thoroughly discussed in the following chapter) while bringing the setting closer to a consumer research project, that subjects are likely to be familiar with. This setup serves to set up a simple and cost-efficient design with tangible rewards that can be replicated using different sets of products. Moreover, it would make sense for participants to have more distinct and well-defined preferences for products that they can taste and are familiar with rather than paintings or hypothetical holiday destinations, making it easier for them to rank and choose between the presented options. Lastly, the number and nature of products were selected to remind subjects of a trip to the convenience store, keeping it easy and short to maximize commitment and well-thought responses.

3.3 Hypotheses

Based on the results previous FCP and ICP studies, there are certain findings are expected to be present here, mostly regarding the spreading of alternatives and the choice behavior of the respondents. A few hypotheses were therefore derived, to be tested for the acquired data.

In the present study, people are neither tricked into thinking that they make choices, as in the study by Sharot et al nor lied to about taking their chosen objects home, as in Brehm's early experiments. However, respondents are still mildly manipulated into making the desired choices by pairing the options of interest with strictly dominated or dominating ones. Therefore, subjects are expected to comply with their initial rankings by choosing the option determined by the system as "to be chosen", and not choosing the one presented as "not to be chosen".

In past FCP studies and literature, the main variable of interest is preference spread between the chosen and unchosen options from the initial evaluation to the final one. After reviewing past findings, we expect the treatments to induce spreading of alternatives. The act of choosing one medianly ranked option in a choice pair and not choosing a similarly valued option in another choice pair, is expected to generate enough dissonance to drive the subject into liking the chosen object more and the unchosen option less than before. In this study, chosen and unchosen options come from the 5^{th} or 6^{th} ranked options from the initial ranking, depending on the participants' choices. Keeping in mind that in this case, we work with rankings from 1(most preferred) to 9 (least preferred), the spread is given by relationship (1):

$$Spread = R1\ (chosen) - R2\ (chosen) + R2\ (unchosen) - R1\ (unchosen) \qquad (1)$$

For choice-induced preference change to be detected, a positive spreading of alternatives has to occur. The subjects are therefore expected to value the selected option more in the second evaluation relative to the unchosen one. For example, suppose that a subject gets allocated to the first treatment, they are guided to choose rank 5 from R1, i.e. 'Lemon Ice Tea' and not choose rank 6 from R1, i.e. 'Sparkling Lemon Juice'. Assuming that the person complies with his initial ranking, and makes the designated choices, then he is likely to rank 'Lemon Ice Tea' higher than rank 5 and/or rank 'Sparkling Lemon Juice' lower than rank 6 in R2, thus producing a positive spreading of alternatives. The same logic applies to the second treatment group.

A significantly positive average spread is therefore expected to occur across the sample, as well as for each treatment group, forming the following hypotheses H1, H1i, H1ii:

$$Spread = R1\ (chosen) - R2\ (chosen) + R2\ (unchosen) - R1\ (unchosen) > 0 \qquad \text{(H1)}$$

Treatment 1 (Rank 5 is 'to be chosen', Rank 6 is 'not to be chosen'):

$$Spread(T1) = R1\ (chosen) - R2\ (chosen) + R2\ (unchosen) - R1\ (unchosen) > 0 \quad \text{(H1i)}$$

Treatment 2 (Rank 6 is 'to be chosen', Rank 5 is 'not to be chosen'):

$$Spread(T2) = R1\ (chosen) - R2\ (chosen) + R2\ (unchosen) - R1\ (unchosen) > 0 \quad \text{(H1ii)}$$

In addition to the stated hypotheses, it could be of interest to compare the choosing and evaluating behavior in different treatment groups. One of the important deviations of the present experiment from the majority of past similar studies is the existence of a second treatment group (incongruent) where subjects are directed to reverse the preferences from one ranking to another, by choosing rank 6 over rank 5 in implicit choice tasks. One could argue that, in the second treatment group, given that subjects comply with their initial rankings in the choice tasks, more dissonance is generated than in the first group, given that the act of choosing the product in rank 6 over the one ranked as 5^{th} brings them in direct confrontation with the inconsistency between their actions and statements. Since the sample is considered to be homogeneous and subjects are randomly allocated into treatments, the following hypothesis is formed to observe and explore how increased dissonance may affect the spread in the second group by comparing it to that of the first (conventional) treatment group:

$$Spread(T1) = Spread(T2) \qquad \text{(H2)}$$

4. METHODS & MATERIALS

4.1 Context and Intake

The experiment took place at the Erasmus University Campus in Rotterdam, where every day thousands of students of various nationalities and disciplines live, study and work. It was conducted at various in-door areas where students usually go during lunch-break (campus cafeterias) to ensure representativeness of the local student population.

The data collection took place on weekdays over the course of 2 weeks, from 22-10-18 to 1-11-18. Responses were collected from 12.00 to 15.00 in the afternoon, when students usually take a break to eat and are likely to have a bit of time to spare and be more incentivized by the prospect of getting a free drink to enjoy with their lunch. As soft drinks are likely to be more appealing in sunny and hot weather, the data collection was postponed on especially rainy and cold days.

Participation in the experiment was voluntary. While the subjects knew that they participated in an experiment, they were not given any information about the purpose of the study until after they had answered all questions, to minimize response bias.

In order to join, subjects were randomly approached by the experimenter during the data collection times and asked if they would like to take a 5-minute survey in exchange for a 50% chance to get a free drink. All participants were greeted in the same way by the experimenter, filled in the survey on the provided laptop, and were given their reward if they won one.

4.2 Survey materials and procedures

The products used for this survey are the following 9 soft drinks: Lemon Ice Tea, Peach Ice Tea, Green Ice Tea, Matcha Ice Tea, Hibiscus and Peach Ice Tea, Non-Sparkling Apple Drink, Sparkling Lemon Drink, Non-Sparkling Lemon Drink, Sparkling Orange Drink.

The selection of these drinks was based on similarity, popularity, and availability, to ensure that participants will be fairly indifferent between the medianly evaluated options, but will still have an idea about how the products taste, ensuring that their evaluations do reflect personal preferences. The selected drinks are considered to be highly substitutable, forming a relatively

homogeneous group of alternatives, and commonly found in supermarkets and vendors around the country, so that students are likely to be familiar with them. In order to test these claims regarding the products used, additional questions have been included in the survey regarding the familiarity of respondents with the products as well as their soft drink consuming habits.
The order of the drinks was randomized in the ranking tasks to avoid anchoring effects.

Data was collected through a short survey following the ICP design. (Appendix A) It was developed using the Qualtrics online survey program and accessed by the participants via an anonymous link on the experimenter's computer. Instructions provided at the start of the survey explained that there were no right or wrong answers and participants should answer honestly and carefully to get their preferred reward.

The survey is structured as follows (see Survey Flow in Appendix B):

Step 1: Subjects are asked to rank the objects from 1 to 9 according to their preferences. This initial ranking is used as a baseline for the individual.

Step 2: Subjects are asked to do some filler tasks to prevent them from remembering the exact order of their ranked options.

Step 3: Subjects are randomly allocated into two treatments do two implicit choice tasks.

> Treatment 1: The subject is asked to choose between the options ranked as 5th and 7th, and between the one ranked as 6th and 4th.
>
> Treatment 2: The subject is asked to choose between the options ranked as 5th and 3rd, and between the one ranked as 6th and 8th.

Step 4: Subjects are asked to repeat Step 1 and rank the 9 objects once more according to their preferences. It is highlighted that this is not a memory task.

Step 5: Subjects answer some demographic and control questions.

Step 6: Subjects receive their reward if they win one.

4.3 Incentives

To ensure that people are sufficiently motivated to exert the mental effort required for carefully answering the survey, a rewards system was set up, in line with the percepts identified by Vernon Smith for economic experiments (Smith, 1982). More specifically, the incentives satisfy the assumptions of Nonsatiation, Saliency, and Dominance. Firstly, Nonsatiation is assumed to be valid for this study, as it follows a one-shot design. If the study was repeated for more rounds with multiple possibilities of rewards for each individual, then it would be necessary to test for satiation. Saliency is achieved by making that the subjects are not lied to or tricked about receiving a reward and that the incentives plan is clear and transparent for them. This is achieved by clear instructions regarding the rewards system and additional verbal explanations provided when asked. Dominance was ensured by keeping the survey simple and short while providing enough motivation for the subjects to invest the time and effort needed to answer carefully and honestly. As participants made the decision to take part in the experiment on their own and stated moderate to high familiarity with the products and frequent consumption of soft drinks, it seems reasonable to assume that the prospect of getting a free soft drink is appealing. One major advantage of using cheap consumer products for the study is that rewards can be tangible and immediate at a small cost, helping to eliminate hypothetical bias.

As soon as they open they survey page, participants are informed by an instructions page that it is in their best interest to answer honestly and that their reward will depend on their answer but no more information is provided. After all survey questions are answered, first a binary lottery determines if the participant will get a reward, and if the outcome is positive, a three-way random lottery determines which one of the three data collection parts (initial evaluation – implicit choice tasks – final evaluation) the reward will come from.

For practical reasons, it was decided that, when the reward comes from one of the evaluation tasks, then it will be either Lemon Ice Tea or Peach Ice Tea. Which one is received by the subject depends on the person's valuations, so that they get the one that they stated to like more from the pair in the respective evaluation.

Therefore, if a person wins a reward, it is determined as follows:

- With a probability of ⅓, the reward comes from the initial evaluation, and the subject receives either Lemon or Peach Ice Tea, based on their assigned ranks
- With a probability of ⅓, the reward comes from the implicit choice tasks, and the subject receives their chosen beverage from one of the implicit pairs, based on a binary lottery.
- With a probability of ⅓, the reward comes from the final evaluation, and the subject receives either Lemon or Peach Ice Tea, based on their assigned ranks.

The study is designed to resemble a real-life situation. In this case, instead of spending their money on a drink, participants are "paying" with the time and mental effort they put into answering the survey for a 50-50 chance to get a drink.

5. RESULTS

5.1 Sample

For this experiment 61 responses were collected, with the respondents being mainly university students working or studying at the campus. All participants were adults, with an average age of 24.5 years. Out of the 61 participants, 31 were female.

In total, 122 implicit choice task responses were collected. 10 of the responses contradicted initial predictions, meaning that the subjects did not behave as directed by the design in one of the implicit choice tasks. The 10 participants whose choices did not comply with their initial evaluations were not included in the analysis, because the spread could not be calculated for them, as it was impossible to form the necessary pairs of chosen and unchosen options.

Out of the 51 participants included in the analysis, 32 (52.5%) were allocated to the first treatment (congruent), and the other 29 were allocated to the second treatment (incongruent).

After responding to the data collection and filler tasks, respondents also answered some questions about their soft drink drinking habits, tastes, and familiarity with the variations used. On average, subjects were found to be quite familiar with the products used and occasional soft drink drinkers, with almost 80% of them stating that they consume soft drinks at least once a month or more often, while 96% claimed to be at least moderately familiar with the products used in the study. Finally, almost 90% of the respondents reported that they liked ice tea at least a little (most of the products used in the study were variations of ice tea)

5.2 Spreading of alternatives

In this analysis part, the hypotheses of the thesis will be put to the test for the acquired dataset. Based on literature and past studies, we expect implicit choice tasks to have generated cognitive dissonance, having had an effect on preferences that will manifest as a positive spreading of alternatives.

After cleaning the data, the first step of the analysis was to compute the average spread across the sample as well as on a treatment level, already predisposing the reader to the somewhat

surprising results. Overall, the spreading of alternatives in the data was found to have a large variability (min spread: -4, max spread: 8), indicating that some of the subjects behaved in unexpected and contradicting ways, by radically changing their preferences from one evaluation to the next. Out of the 51 subjects included in the analysis, 28 (54.9%) exhibited a negative spread, for 18 (35.3%) a positive spread was found, and for the remaining 5 (9.8%), the spread was equal to zero.

Proceeding to explore our stated hypotheses H1, H1i, and H1ii, which were derived from the expectation that a positive median spreading of alternatives would occur across the sample. A Wilcoxon signed rank test was conducted to see if we can find evidence to eliminate the possibility of median spread=0. However, the outcome from the Wilcoxon signed rank test yielded a p-value that is not significant at the 5% level of significance (p-value=0.301), so we cannot reject the null hypothesis that spread=0. Consequently, we could not obtain evidence supporting the first stated hypothesis H1, as there is no evidence of a positive spreading of alternatives. (see Table 2)

Table 2: Median Spread and Hypothesis testing in the total sample and by treatments

	Median Spread	Standard Deviation	Wilcoxon signed rank test (H0: spread=0)	Number of Observations
T1 (Congruent)	-2	2.31	z=-2.534, p=0.011	26
T2 (Incongruent)	0	2.85	z=-0.991, p=0.231	25
Total	-1	2.76	z=-1.034, p=0.301	51

In the first treatment group, the median spread was negative and equal to -2. This group (congruent) was the only one where the Wilcoxon signed rank test provided evidence that the median is different from zero, as the p-value obtained was significant at the 5% level of

significance (p-value =0.011). However, we still cannot confirm hypothesis H1i, which predicted a positive spread.

In the case of the second treatment group, the Wilcoxon signed rank test yielded an insignificant p-value at the 5% level of significance (p-value=0.231) so we cannot reject the null hypothesis that the median spread is equal to zero. Thus, the current dataset does not provide evidence to support the hypothesis H1ii, which came from expecting to find a positive spreading of alternatives.

5.3 Comparing treatment groups

When comparing the two treatment groups, there are evident differences in the distribution of the spread for different treatments (see Figure 1). Considering the assumption that the two groups were homogeneous, and all other conditions were the same in the two groups since allocation to groups was random, this significant differences in behavior should be due to the different treatments.

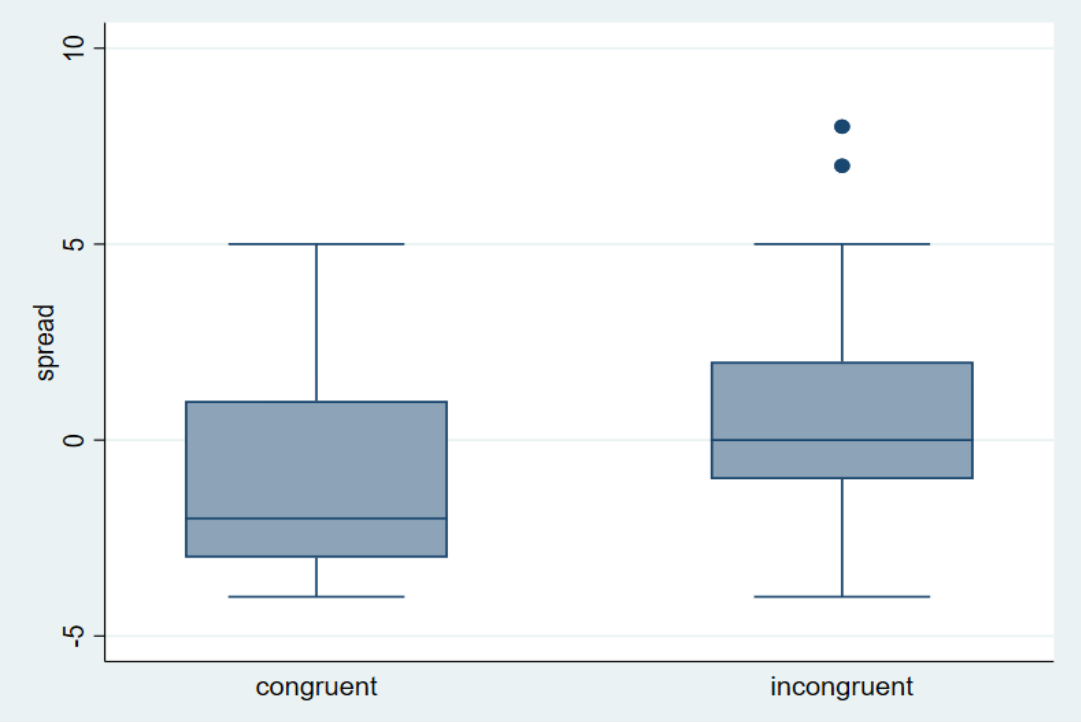


Figure 1: Spreading of alternatives in the two treatment groups

Subjects in the first group mostly exhibited negative spread, while the distribution of the spread was more uniform for the incongruent choices treatment. In the second group, there was more variation (st.dev. =2.85), compared to the rest of the sample (st.dev. =2.31). A wider range of spread values was observed for the second treatment condition, with some extreme cases of positive spread (spread=7, 8).

To test the effects of different treatments, a Mann Whitney U 2-sample (Wilcoxon rank-sum) test by treatment was conducted, testing if there are significant differences between the treatment groups. The results provided enough evidence to reject the null hypothesis, with a p-value significant at the 5% level (p-value=0.0045), thus confirming that the outcomes in the two treatment groups are systematically different, and proving the last of our hypotheses, H2 (stating that spread will be the same in both treatments), to be invalid. Therefore, being assigned to the congruent or incongruent group has different effects on people's final evaluation.

Considering the significant difference in behavior between the two treatment groups (see Figures 1, 2), the assumption that those differences were a result of different treatments and not innate differences between the two groups was put to the test. A linear regression model was thus developed with the spread as the dependent variable, and age, gender, habits, tastes, treatment and time spent in total and on each ranking used as descriptors. For the categorical variables concerning habits and tastes, dummy variables were created. Familiarity was not included in the model, as almost all subjects stated moderate to high familiarity with the products used. A linear model was created as follows:

$$Spread = \beta 0 + \beta 1\ Age + \beta 2\ female + \beta 3\ treatment + \beta 4\ like + \beta 5\ indifferent\_dummy + \beta 6\ imonthly\_or\_more + \beta 7\ mins + \beta 8\ R1mins + \beta 9\ R2mins$$

After running the linear regression, the overall fit of the model was at R^2 = 0.22, and all of the independent variables included were found to be insignificant at the 95% confidence interval, with the exception of treatment (For regression table see Appendix B1). The variable of treatment was the only variable with a p-value significant at the 5% level of significance (p-value= 0.02) and a beta coefficient of 1.94, meaning that being allocated to the second treatment group increases the spread by 1.94, ceteris paribus.

Decomposing the spreading of alternatives, it is interesting to look at the difference in ranks of chosen and unchosen options between rankings, by treatment (See Figure 2).In the first treatment, the direction of the change in rankings for the chosen (accepted) and the unchosen option (rejected) was exactly opposite than expected based on the results found in past literature. As one can see in Figure 2, participants who chose the object initially ranked as fifth and did not choose the one ranked as sixth in the implicit choice tasks, seemed to evaluate the chosen product lower and their unchosen option higher in the final ranking.

In treatment 2, the difference in rankings for chosen and unchosen options was closer to expected behavior. In this case, respondents tended to rank their chosen option (initially ranked as sixth) higher in the final evaluation, as predicted by the theory. As for the unchosen option of the implicit pair in the second treatment group (initially ranked as fifth), it looks like the difference in ranks was evenly distributed in both directions, with a mean of zero ranks difference.

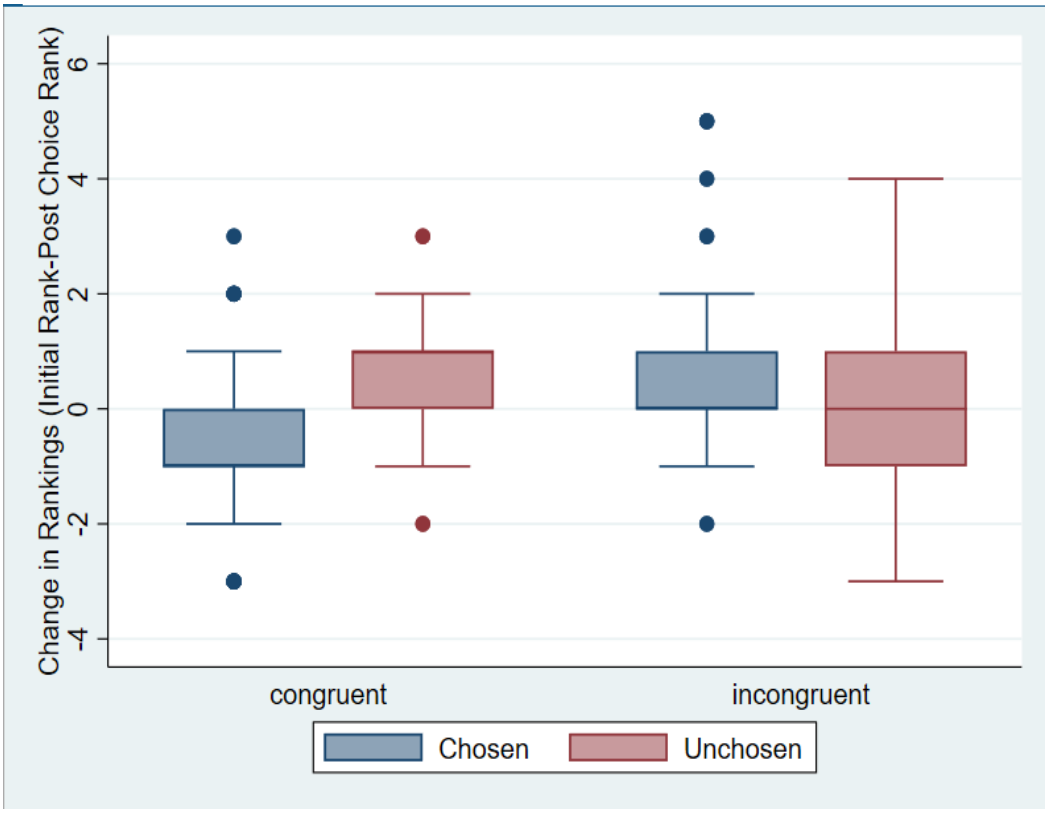


Figure 2: Change in Rankings from initial to the final evaluation, by treatment

5.4 Time spent on the survey

To get a better understanding of how respondents dealt with the survey, and how much effort they put into filling it in we next looked at how much time respondents spent on it. The survey was designed to record the time from opening the survey to completion, as well as the time needed for each of the evaluation tasks (see Table 3). Here there was also a wide range of different behaviors, with the average time of completion being at around 5 minutes with a range from 2.3 to 15.5 minutes spent. Subjects seem to spend more time on the initial evaluation compared to the second one. This is in line with intuition as subjects are probably more tired and more familiar with the products and their own preferences in the final ranking, compared to the initial one. The average time spent by subjects on rankings was a bit more than a minute for the first ranking and around one minute for the second one, and there was no significant effect of treatment group on the time spent by subjects on the survey or on rankings.

Table 3: Time spent by subjects on the survey in minutes

	Average	Standard dev.	Min	Max	Number of Observations
Total Survey	5.16	2.38	2.3	15.5	51
Initial Ranking	1.3	0.98	0.20	5.57	51
Final Ranking	0.94	0.58	0.10	2.99	51

All analyses were performed using Stata/MP 15. A P-value of smaller than 0.05 was considered significant.

6. DISCUSSION & LIMITATIONS

6.1 Discussion of the results

In this thesis, the implicit choice paradigm by Alós-Ferrer et al was employed to detect choice-induced preference change an experimental study. To ensure that the subjects state their true preferences, tasks were incentivized using real rewards that were given out at the end of the survey and depend on the subject's responses. In the end, results ended up contradicting expectations formed by past studies and relevant literature. Instead of finding a positive preference spreading, as in past studies with similar designs, the median spread across our sample was found to be not significantly different from zero. Only in the case of the first treatment, the median spread was found to be significantly different from zero, but more likely to be negative rather than positive. As a result, none of the tested hypotheses was proved, but a few interesting observations came up. It is important to look for the reasons behind this unexpected behavior and discuss the learnings and lessons that can be obtained from these outcomes.

As explained in the results section, all of the hypotheses formed based on the results of previous studies were disproved. The outcomes of this experiment did not indicate a significant spreading of alternatives, and there could be different reasons for this.

Many authors agree that Cognitive Dissonance is the driver of choice-induced attitude change, as it was described in the literature review. This theory assumes that the individual is aware of their two contradicting cognitions, which are important enough to cause the state of discomfort. In this case, it could be that the respondents experience little to no dissonance from giving contradicting answers to preference questions. If their preferences were vague and unclear, and they answered in a hurry, it might have been the case that they did not even realize that their answers were inconsistent and contradictory. Thus, it could be that the state of Cognitive Dissonance was not triggered thus not creating a reason for preference change.

Another reason why subjects did not behave as expected could have to do the rewards. In the present study, responses in the evaluations and implicit tasks were found to be highly irregular and inconsistent both within subject and between subjects, as shown in the results section. The spread range is quite large (-4 to 8), while subjects did not behave in a uniform way when re-

ranking chosen and un-chosen options (see Table 2 in the results section). One factor that could have led to these results may have to do with the products used. Subjects reported relatively high familiarity with the products, so they must have had at least weak preferences for them. However, with soft drinks being a cheap and easy to find commodity, and the listed drinks being highly substitutable, it is highly likely that the subjects cared more about completing the survey than which one of the drinks they will get. Moreover, with every task incentivized, and a 50% chance of not getting a prize, it could be that, although the system was fair, it did not motivate people enough to carefully contemplate every step. It explicitly stated that there is no right or wrong answer and the survey is anonymous, so that the only possible consequence from giving inconsistent answers, is receiving a drink that is not your favorite.

A striking observation in the results was how differently people behaved in the two treatment groups. Although no significant positive spread was created, it was clear from the visual representations and tests ran in the analysis part, that treatment does have an effect on the spread. Although there was no significant spread, from comparing the two treatments it seemed that the incongruent choices treatment was more likely to detect a positive spread, if the experiment is replicated**.**

This study yielded somewhat surprising results, but one should keep in mind that it was a simple, low-budget and small scale study that may have suffered from a few experimental shortcomings.

6.2 Limitations

Clicks per page: Contradicting behaviors were observed in the time spent by subjects on evaluation tasks, with some subjects even spending less than half a minute on the final ranking and others spending up to 3 minutes. As the survey program used (Qualtrics), did not permit the recording of clicks/page, and the order of the objects presented on the page was randomized, we cannot rule out the possibility that some of the subjects ranked the options at a random order.

Missing the ice tea season: Due to complications that occurred along the course of this project, the data collection period that was scheduled for the summer months, eventually took place around the end of October- early November. This may have had an impact on the obtained results since the products used as rewards (cold soft drinks) are likely to be more desirable when the weather is hotter. Although the weather was not bad during the data collection, it was still

central-Europe autumn weather. This could possibly have had an effect on the respondents' dedication to the survey and the motivation caused by the rewards.

6.3 Recommendations and further research

In order to avoid the shortcomings of the present experiment in a similar future study, a few strategies and caveats were spotted ad hoc, thus some recommendations for similar future studies were formed. In addition, some interesting concepts from the relevant literature that were not touched in the present study, are proposed as ideas for further research.

Prevent Rushing through the survey: One of the shortcomings of this study was that many subjects did not spend enough time evaluating alternatives. In order to avoid participants rushing through the survey and answering at random when designing a similar survey using a survey program, one should consider imposing a minimum time to spend on each question, before which the subject is not allowed to proceed to the following question.

Visualization of the rewards: In the present study, no brands were mentioned and no further stimuli were provided, to avoid effects of brand preference and extra noise. However, no stimuli could make it hard to choose - intangible, especially between closely related products. An idea for further research to increase involvement with the objects could be to have the different products lined up in front of the participant during the experiment, like in Brehm's initial experiment back in 1956. This could be implemented for experiments conducted in person, such as the present study, or in an online survey by including appealing photos of the products.

Triggering Cognitive Dissonance: To ensure that cognitive dissonance is triggered in future ICP studies, it could be of use to have the subjects justify their choices following the implicit choice tasks. This could be done, for example, by adding a justification part following the choice tasks and before the final evaluation. In the case of a survey such as the one used here, the justification part could be comprised by multiple choice questions asking the subjects to answer why they chose one option over another.

Time needed to make a choice: In the present study, only the evaluation tasks were timed. However, in the 2012 paper by Alós Ferrer et al, the authors find evidence that the reappraisal period (when the preference change takes place), begins at the choice tasks, and for more

difficult choices (the more closely items are rated), subjects take more time to choose. It would therefore be advisable for more studies to explore the relationship between time spent on choice tasks and the generated spreading of alternatives.

Using real rewards, realistic settings: This study has been a step towards the direction of bringing the ICP closer to the economic theory and real-life situations, but there is still a lot of room for improvement. There is a need to increase involvement and proximity to real life economic contexts. For example, this study could be replicated within a store, or an online store, making sure that the subjects' behavior will be as close as possible to their actual purchasing behavior.

7. CONCLUSION

In this thesis, the literature and past studies exploring choice-induced preference change were discussed, and an experiment with real rewards was set up to replicate the findings of previous Implicit Choice Studies. The final results contradicted initial predictions, as no significant choice-induced preference change occurred. However, there are still some interesting findings and contributions from this study that could be useful for future research.

One key point we can draw from the results is that the two different treatments had significantly different results on the spreading of alternatives. Therefore, being assigned to make a congruent choice is likely to be associated with different spreading (in absolute values) than being assigned to make an incongruent choice through implicit choice pairs. It could therefore be of scientific value to further explore the different effects of the two treatments in the context of the ICP.

As no significant choice-induced preference change was detected, this study did not shed light on the causes of preference change as a result of choice. There could be various reasons for this result, such as the products used being too low involvement to induce a feeling of ownership or the need to justify contradicting responses, and that cognitive dissonance was not created due to the studies. For future research, it is recommended to replicate this design with alterations to ensure that subjects are more involved with the products used as rewards, and are made more aware of their choices by introducing a justification task.

Despite the limitations mentioned earlier, the present study contributes to the FCP literature especially by bringing the paradigm closer to real life economic behavior. It is therefore advised that this design is replicated in a different setting, after careful consideration the findings and caveats pointed out in the present experimental study as well as the existing literature. There is still much need for research on the bidirectional relationship between choices and with many practical and direct applications in digital and direct marketing, as well as in behavioural economics and choice architecture. One day, the concept of choice-induced preference change may hopefully be used by economists to enrich preference models and serve as a useful tool in the hands of policy makers to guide economic behavior.

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APPENDIX

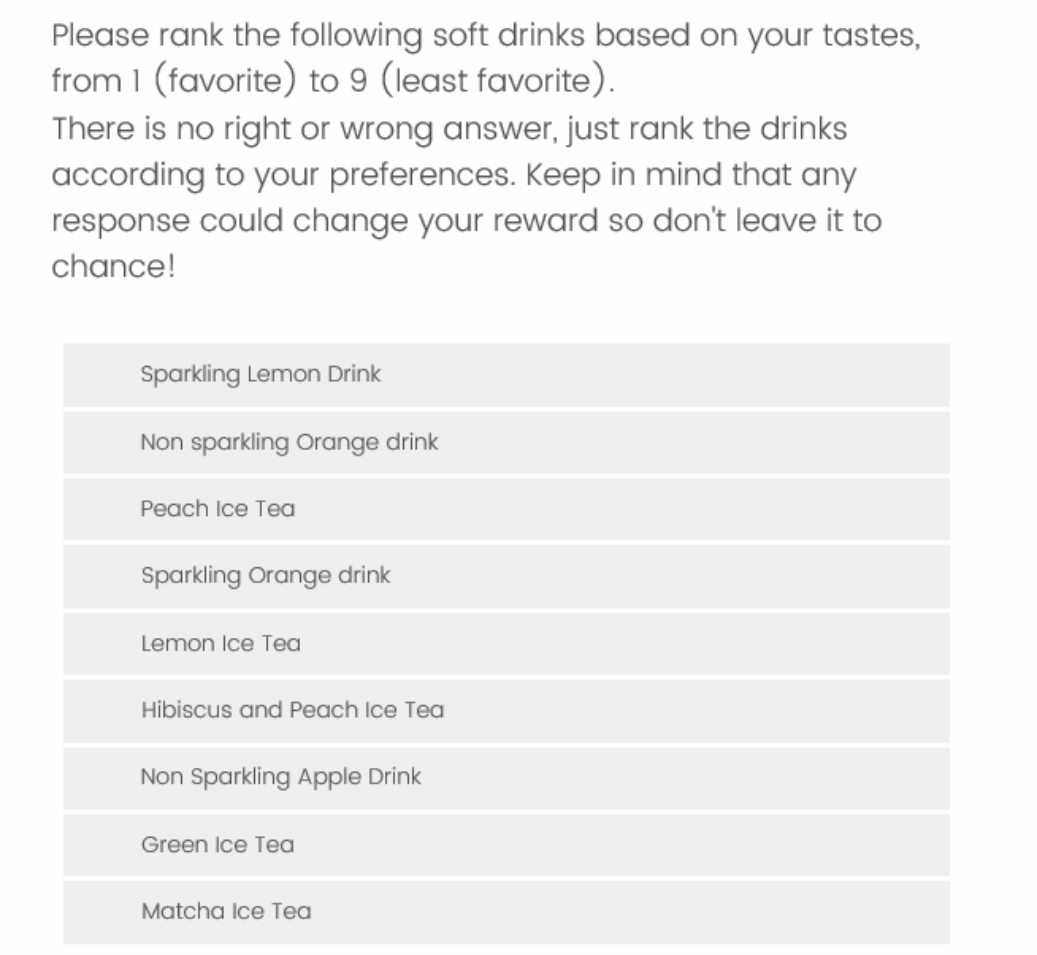
A1. Survey

Screen 1: Introduction-Instructions

Hello there!

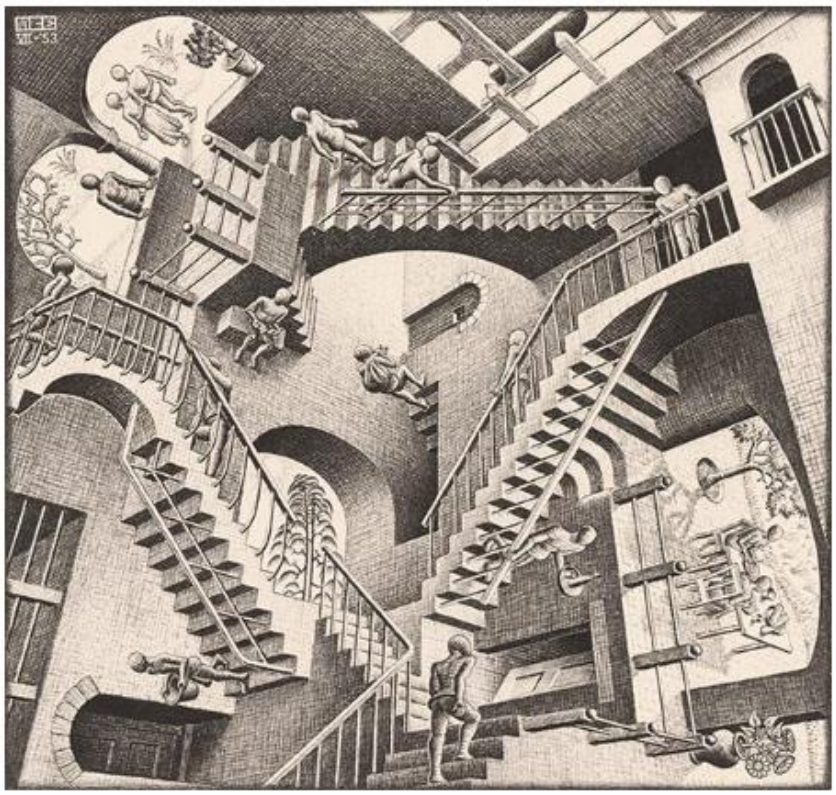
Thanks for helping me with my thesis by completing this survey.
In the following tasks, you will rank & choose soft drinks and solve some puzzles.
The survey is very brief and will only take about 5 minutes to complete.
Please answer each question carefully, as every other participant will receive a soft drink that will be determined by their responses. Answering honestly is therefore at your best interest.
All answers provided will be kept anonymous and confidential.
More information about the purpose of the questions will be provided at the end of the survey.

Screen 2: Initial Ranking (Drag & Drop)



Screen 3: Filler 1

Have you heard of Maurits Cornelis Escher (1898-1972)? He is one of the most famous graphic artists in history, and some of his most well-known works are in Het Palais in the Hague. Here is one of Escher's most popular works, called Relativity. How many people do you see in the picture?



Please state your response

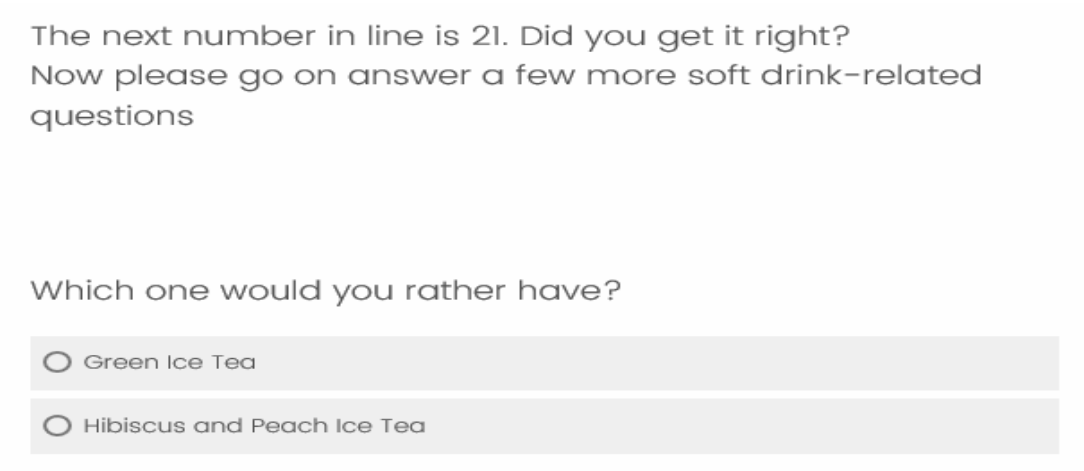
Screen 4: Filler 2

The correct answer is 16! Did you get it right? Other than a great artist, Escher is also considered to be a mathematical genius! Let's take a minute to solve an fun math question in his memory

Which number should come next in this series?
1-1-2-3-5-8-13

- ○ 8
- ○ 13
- ○ 21
- ○ 26
- ○ 31

Screen 5: Implicit Choice Pair 1 The options presented differ based on the ranks assigned and the treatment group the subject is allocated to (see Appendix A.2)



Screen 6: Implicit Choice Pair 2 The options presented differ based on the ranks assigned and the treatment group the subject is allocated to (see Appendix A.2)

Screen 7: Re-Ranking Task (Drag & Drop)

Now please rank the following soft drinks once more based on your tastes, from 1 (favorite) to 9 (least favorite). This is not a memory task and there are no right or wrong answers, so just rank the drinks according to your preferences. Don't forget that any response could affect your reward so please answer carefully.

- Sparkling Lemon Drink
- Non Sparkling Apple Drink
- Non Sparkling Orange Drink
- Green Ice Tea
- Lemon Ice Tea
- Peach Ice Tea
- Sparkling Orange Drink
- Hibiscus and Peach Ice Tea
- Matcha Ice Tea

Screen 8: Demographics and Controls

How often do you consume soft drinks?

- ○ Everyday
- ○ At least once per week
- ○ At least once a month
- ○ A few times a year
- ○ (Almost) Never

How familiar are you with the beverages you were asked to rank and choose in this survey?

- ○ Very familiar, I have tried most of them before
- ○ Moderately familiar, I have tried some of them and I guessed how the rest of them taste
- ○ Not at all familiar, I have only tried 0-2 of them before

Do you like or dislike Ice Tea beverages?

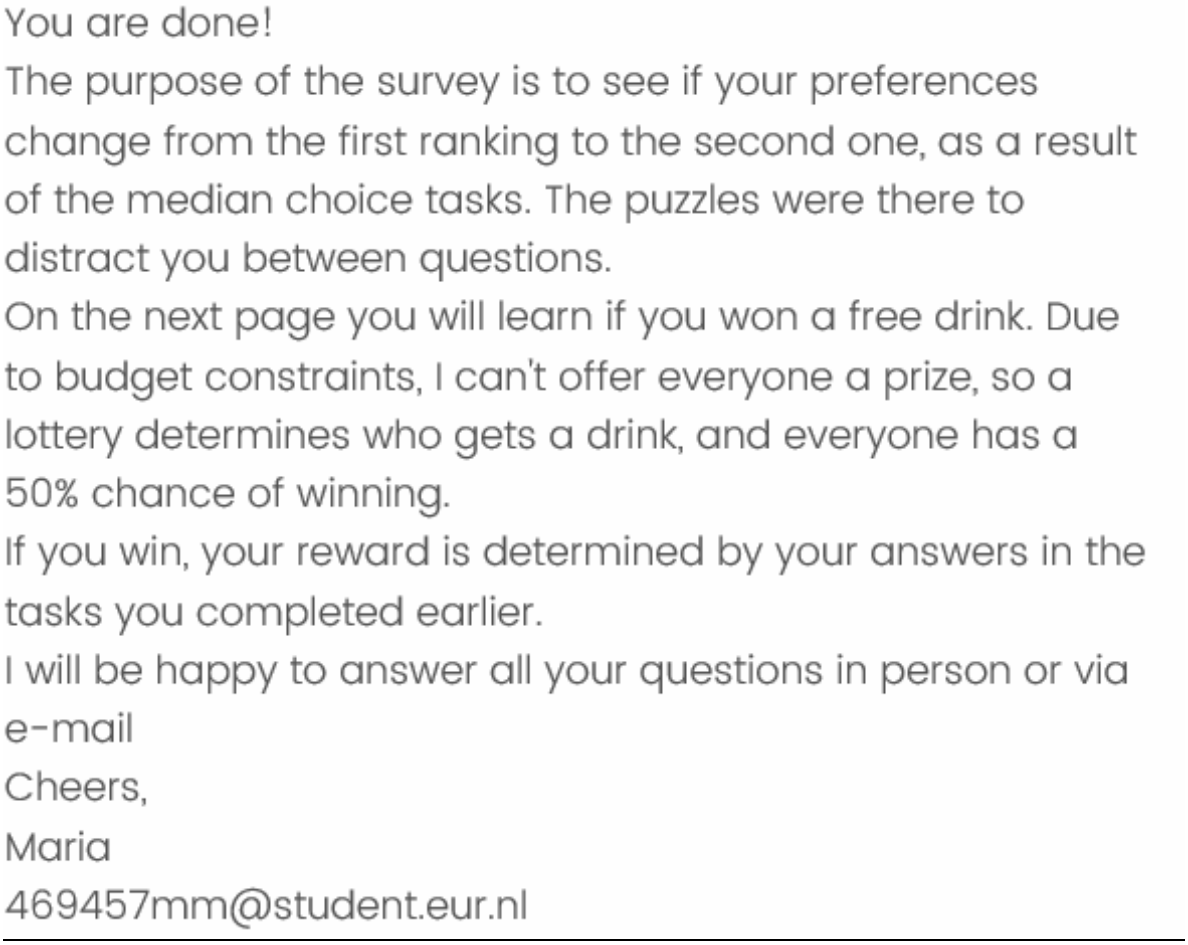
- ○ Like a great deal
- ○ Like a moderate amount
- ○ Like a little
- ○ Neither like nor dislike
- ○ Dislike a little
- ○ Dislike a moderate amount
- ○ Dislike a great deal

What is your age ?

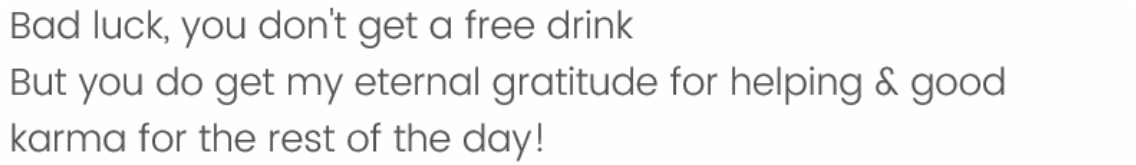
What is your gender?

- ○ Male
- ○ Female

Screen 9: Explanations & Reward Mechanism

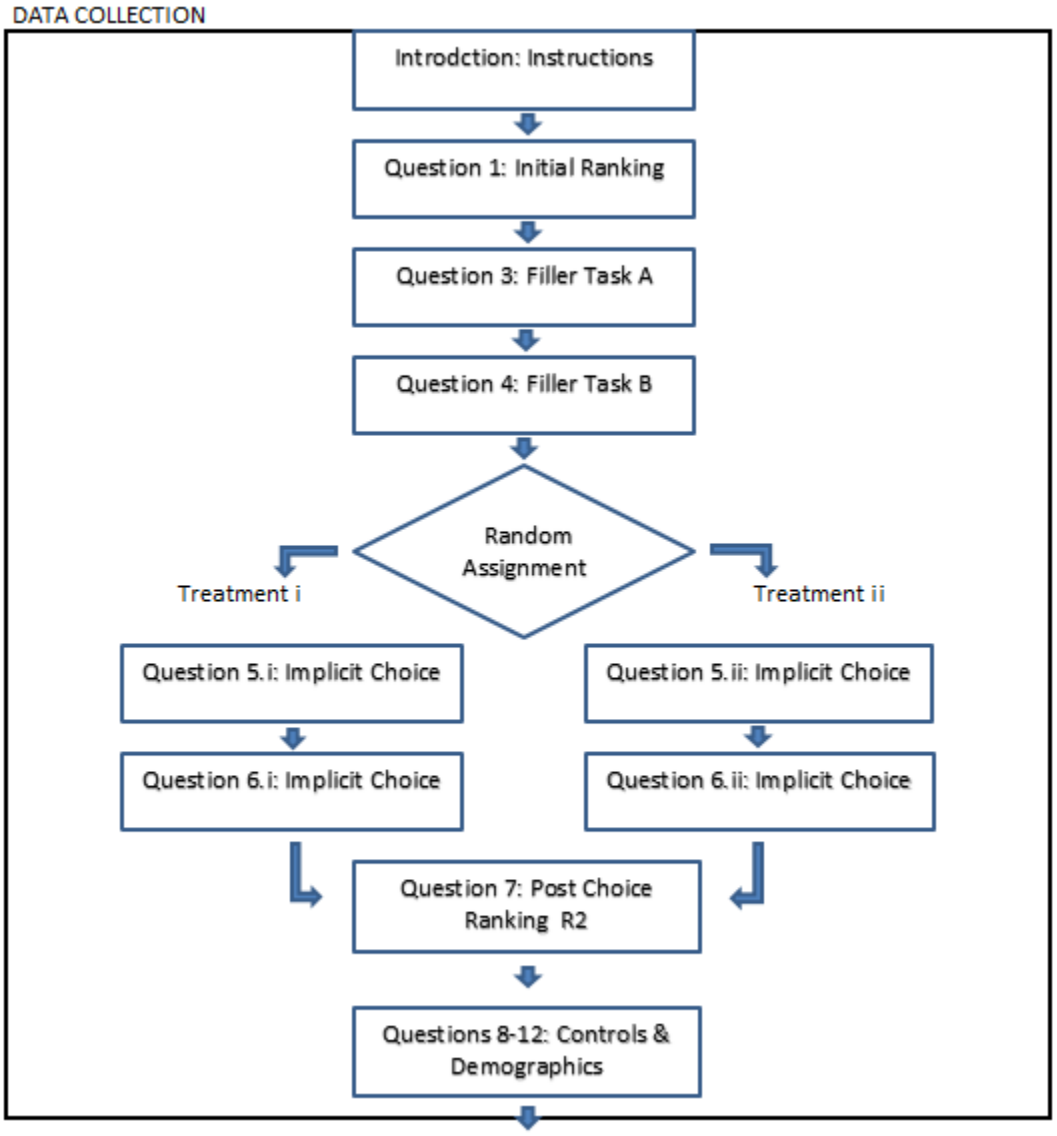


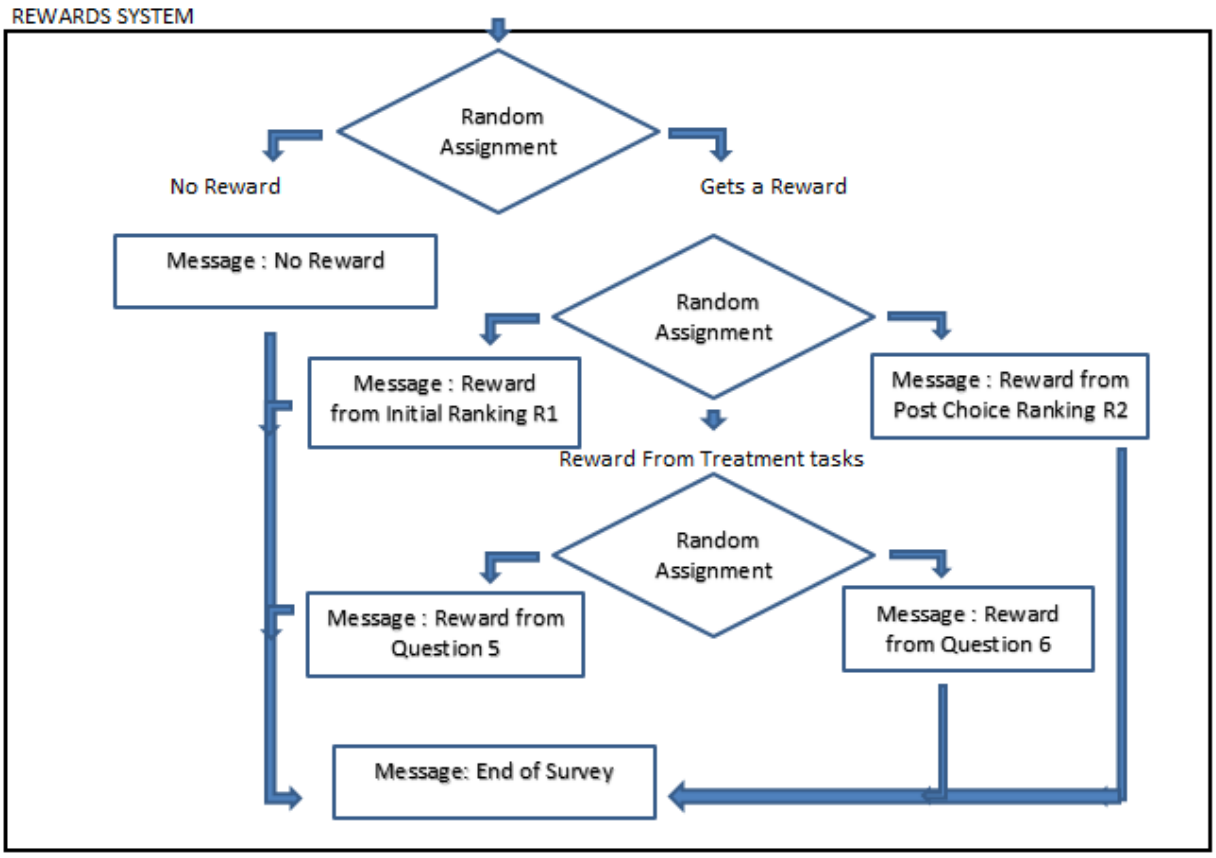
Screen 10 i: No Reward: Determined by the Rewards Scheme as seen in Appendix A.3



Screen 10 ii: Reward: Determined by the Rewards Scheme as seen in Appendix A.3

A2. Survey Flow & Rewards System




REWARDS SYSTEM
Random Assignment
No Reward
Gets a Reward
Message : No Reward
Random Assignment
Message : Reward from Initial Ranking R1
Message : Reward from Post Choice Ranking R2
Reward From Treatment tasks
Random Assignment
Message : Reward from Question 5
Message : Reward from Question 6
Message: End of Survey

B1. Linear Regression Output

$$Spread = \beta 0 + \beta 1\, Age + \beta 2\, female + \beta 3\, treatment + \beta 4\, like + \beta 5\, indifferent\_dummy + \beta 6\, imonthly\_or\_more + \beta 7\, mins + \beta 8\, R1mins + \beta 9\, R2mins$$

Linear regression

Number of obs	= 51
F(8, 41)	= .
Prob > F	= .
R-squared	= 0.2293
Root MSE	= 2.6753

spread	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age	.0638536	.1389239	0.46	0.648	-.2167089	.3444162
female	.7831581	.8053233	0.97	0.337	-.8432252	2.409541
treatment	1.938308	.8165738	2.37	0.022	.2892038	3.587412
like_dummy	-.2850375	1.648875	-0.17	0.864	-3.615008	3.044933
indifferent_dummy	-1.633844	1.792925	-0.91	0.367	-5.25473	1.987042
monthly_or_more	-.1398727	1.019999	-0.14	0.892	-2.199803	1.920058
mins	-.2481567	.1686875	-1.47	0.149	-.5888279	.0925145
R1mins	.5010751	.5598987	0.89	0.376	-.6296633	1.631813
R2mins	-.1758324	.8127379	-0.22	0.830	-1.81719	1.465525
_cons	-3.849458	4.52765	-0.85	0.400	-12.99323	5.294316

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