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Nudging people's decisions using social information as the default option

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CHAPTER ONE: INTRODUCTION

1.1 Studying decisions

The concept of decision has been differently defined through the years. In the book "The Psychology of Judgment and Decision Making" by Hastie and Dawes (2011), it is defined as an individual's reaction to a situation with three characteristics: alternatives, subjective probabilities, and consequences.

The first factor of this situation, the alternatives, refers to the fact that in the decision's making process, an individual is faced with more than one behavioral option. Each of these options has some expectations, which means that the agent will assign subjective probabilities to each of these options. Moreover, the agent will forecast the consequences of these paths based on his past experiences and objectives.

Decisions have been studied using many approaches, which could be summarized in three main categories that are the normative approach, the descriptive approach, and the prescriptive approach (Bell et al., 1988).

1.1.1 The normative approach

The normative approach in decision-making was mostly used by mathematicians and philosophers during the 60s. This approach aims to establish criteria and rules for how we *should* make rational decisions. One of the most useful studies that contributed to starting to indagate this topic is from the Swiss mathematician Bernoulli (1738). He developed a game, later defined as the St. Petersburg Paradox, in which he tried to assess people's willingness to pay for a coin toss. According to the rules of this game, the participant wins as long as the coin toss' outcome is head, and the match will go on till the tail is the outcome. Moreover, at every coin toss, the sum won by the participant gets doubled. The participant will win the cumulated sum and lose the money he used to play the game.

Rational choices to play this game could be made using the formula for the expected value. In line with the formula, it is necessary to multiply the value of each outcome by its own likelihood of happening and finally sum these products.

$$EV = \sum i \, pi \, vi$$

The outcome "head" could repeat itself infinitely, so its expected value is infinite as well. Therefore, we should expect people willing to invest high sums to play the game. Nevertheless, it has been observed that this scenario is infrequent since the more a player pays and the less will be his net gain. People's behavior in this scenario has been explained by the utility function theorized by Bernoulli.

In economics, the term utility describes the value of a good or service and, specifically, the satisfaction derived from using it. The utility function explains that larger amounts of goods lead to a marginal diminishing utility.

This signifies that there's not a linear relationship between utility (perceived benefit) and objective values (e.g amount of money that could be won in the game), since as the objective value increases, people tend to perceive lower utility.

Several years later, in 1947, expanding Bernoulli's theory, the mathematician Von Neumann and the economist Morgenstern developed the expected utility theory. According to the two scientists, when an individual makes a choice, the rational decision should be the one that maximizes the expected value of the utility, that is, the level of satisfaction that can be derived from the choice (Von Neumann & Morgenstern, 2019b).

The combined work of Von Neumann and Morgenstern led to the development of a series of rational axioms, including the independence axiom, the transitivity axiom, the dominance axiom, the regularity axiom, and the invariance axiom. They could be considered as criteria useful to make rational decisions.

The counterintuitive effect observed in the St. Petersburg Paradox and the violations of the rational axioms show that the normative approach, trying to describe rational and mathematical criteria for our decisions, often doesn't mirror reality.

1.1.2 The descriptive approach

The aim of this approach is describing how people behave in their everyday lives, not considering rational axioms and maths. In contrast with the assumptions of the scientists of the normative approach, people mostly do not behave following mathematical tenets and economic rules.

Starting from this observation Herbert A. Simon, Nobel prize winner in behavioral science, developed the concept of Bounded Rationality in 1955. He claimed that people's conduct often deviates from rationality, and they don't behave as economic agents. Hence, he leveraged the term "bounded" to explain that human thinking is limited because people have limited cognitive resources; their decision-making process is not always fully informed, and they don't have stable preferences (Simon, 1997).

In its work Simon (1990) explained the reason why economic theories are not sufficient to explain human behavior, describing it as a scissors in which one blade represents the environment in which we make the decision, and the other one is the cognitive skills of the agent. Studying just one of the two factors of this process is not enough to understand how decision-making processes work (Todd & Gigerenzer, 2007].

Simon also elaborated on the concept of *satisficing,* trying to describe how people make decisions. According to this idea, individuals, when faced with complex and uncertain situations, tend to make satisfactory decisions rather than seeking the optimal or perfect choice. Satisficing involves identifying a solution that meets a certain acceptable criteria level, even if it may not be the best option. By doing so, people conserve cognitive resources and time, which is particularly important when dealing with information overload and limited processing capacities (Simon, 1978).

1.1.3 The prescriptive approach

The prescriptive approach tries to correct decision-makers' systematic errors, guiding them toward a normative ideal. It aims at supporting individuals by taking into account their cognitive limitations and helping them with tasks and operations that are particularly challenging. For example, teaching decision-makers procedures to reduce errors and suggesting more effective and accurate methods.

1.2 Dual processes theories

The dual process theories were firstly developed by James and Epstein and then further indagated and updated by many scientists such Sloman, Slovic, Kahneman and Evans.

The key point of this theory is that our thinking could result from two different processes, an automatic, unconscious process, or a controlled, conscious process. Different definitions and sub-theories of these two processes have been published throughout the years, but all of them include similar content about them.

The first process, often labeled as System 1, works automatically and rapidly, requiring minimal to no exertion and without deliberate control. On the other hand, System 2 directs focus toward cognitive demanding activities, such as complex computations, which necessitate effort. The System 2 operations are frequently linked to the subjective sensations of agency, choice, and concentration.

To explain how these two systems work, Kahneman uses two examples. The first is a photo of an angry woman with her mouth open. He observes that, typically, looking at this picture, we don't need any effort to understand the woman's mood and anticipate what she's about to do; it happens automatically and quickly. System 1 is in charge of similar processes (Kahneman, 2011b).

On the other hand, if we are faced with a calculation as 17 x 24, we might need some time and effort to elaborate the result. This last process will be slower. System 2 oversees similar processes.

As mentioned by Kahneman, other tasks that could be attributed to System 1 are computing 2 + 2, differentiate between the distances of two objects, respond to the origin of a sudden sound, perceive hostility in a person's voice, drive a car on an empty road. Examples of operations of Systems 2 could be seek out a woman with white hair, retrieve a surprising sound from your memory, maintain a faster walking speed than what is natural for you, count the letters "a" on a page of text, share your phone number with someone, complete a tax form.

To summarize, System 1, the automatic system, is in charge of tasks for which we can use our innate skills or carry out automatically using past experiences' information. System 2, conversely, is activated when we need to use attention to perform well in a specific task.

1.2.1 Interaction and conflicts between the systems

The two systems often interact and could have conflicts. Both of them use our attention, even if differently. An example is the invisible gorilla video by Christopher Chabris and Daniel Simons (2010). In the video, two teams with different t-shirts play basketball, and the study participants are asked to focus on the number of steps of a specific team and ignore the other one.

Results show that half of the subjects watching the video, focused on the task, mostly do not see a gorilla appearing in the scene for 9 seconds.

The video is an excellent example of two phenomena called change blindness and blindness to change blindness. The last concept refers to the fact that most participants are even amazed to have missed such a relevant stimulus. This example explains our limited attentional skills. When required to focus on a cognitive task, our attentional resource will most likely be directed to that task, and other stimuli competing for attention won't be powerful enough to be detected.

Another example of a task in which the two processes could encounter conflicts is the Stroop effect (Stroop, 1935b). It is a psychological phenomenon identified by psychologist John Ridley Stroop in the 1930s. In the Stroop test, participants are presented with a list of words printed in various colors and are tasked with identifying the ink color rather than reading the words themselves. This interference occurs when the word's meaning hinders the ability to name the ink color, resulting in delayed reaction times. The Stroop effect is closely connected to the dual processes theory because reading words is a well-practiced task automatically operated by System 1. Nevertheless, in the task, participants are also required to name colors, and this could be performed by System 2, with a more controlled and effortful process, especially if the name of the color and the ink do not match, causing interference.

1.2.2 Cognitive illusions

Cognitive illusions are another phenomenon that shows how System 1 and System 2 work. In his book, Kahneman uses the example of the optical illusion of two lines appearing to be of different lengths - the so-called *Müller-Lyer illusion* -, or at least that is what System 1 intuitively tells us (Kahneman, 2011c). However, if you take the time and effort to measure them, you will find they are exactly the same length.

Such deceptions are challenging to avoid since System 1 works automatically and because the error monitoring, usually performed by System 2, does not occur in all cases if the system is unaware of the error. The slow functioning of system 2 is often ineffective in detecting errors in System 1, especially if the task we are performing is new and, therefore we have no expertise about the potential errors in that case.

1.3 Prospect theory

Kahneman and Tversky studied the previously introduced theory of expected utility and analyzed the most typical violations of the rational axioms associated with the theory. This led them to formulate an alternative approach called the Prospect Theory (Kahneman & Tversky, 1979b).

This model focuses on decision-making under risk, and its name refers to Kahneman and Tversky's studies on gambling. In fact, "prospect" could be considered as a scheme of possible lottery outcomes. The purpose of the theory is to explain why people often do not choose the best available option.

The theory applies to monetary prospects with probabilities, but it can also be applied to other types of decisions. It shows that the decision process is divided into two stages: editing and evaluation. In the editing stage, a preliminary investigation of the offered prospects is made, and in the second stage, the processed prospects are evaluated, and the best prospect is selected. The editing stage is divided into several sub-stages.

- **Coding**: Normally, people see the outcome of a risk as gains or losses relative to a reference point. The positioning of this reference point could be influenced by the framing of the prospects and the individual's expectations.
- **Combination**: It's the process by which prospects with identical outcomes could be associated.
- **Segregation**: Consists of segregating the riskless component.
- **Cancellation**: Is useful to delete the components shared with other prospects.
- **Simplification**: Refers to rounding probabilities and cutting out the most unlikely alternatives.
- **Detection of dominance:** Is the analysis of the prospects used to find and delete the dominated alternatives.

Kahneman and Tversky also studied how the different order of application of these strategies might affect the process. Applying one strategy before the other leads to different results. The above strategies underlie the use of many heuristics, commonly exploited at this stage.

As mentioned before, the evaluation phase consists of choosing between the edited prospects. This process is influenced by the value and the probability of the outcomes, which have been studied through two functions, the value, and the weighing function. The first one refers to the value of the outcomes, and the second, the weighing function, explains the decision weight given by the decision maker.

1.4 Heuristics

Herbert Simon, already mentioned previously, can be credited as the pioneer in discussing heuristics during the development of the theory of bounded rationality.

He introduced the notion of heuristics in connection with the concept of *satisficing*, which postulates that individuals facing complex and uncertain situations continuously explore available alternatives until reaching a preset level of acceptability. According to Simon, people often deviate from economic principles or rational norms when making decisions, and instead, they frequently apply strategies to achieve this satisficing state. These strategies are referred to as heuristics, representing mental shortcuts used to facilitate decision-making. Subsequently, the concept of heuristics was further refined by Kahneman and Tversky, particularly in relation to cognitive biases. In 1974, they published an influential article titled "Judgment Under Uncertainty: Heuristics and Biases," wherein they delved into the cognitive biases that arise from the application of judgmental heuristics in decision-making under conditions of uncertainty. Within the same article, they identified three primary types of heuristics: availability, representativeness, and anchoring and adjustment (Tversky & Kahneman, 1974b).

1.4.1 The availability heuristic

The availability heuristic, as defined by the authors, refers to "the ease with which instances or occurrences can be brought to mind." In order to illustrate this concept, the authors conducted a study where participants were asked to estimate whether there are more words in the English language that have "K" as the first letter or as the

third letter. A significant number of respondents erroneously selected the first option, which can be attributed to their intuitive thinking. It is indeed more challenging to collect words with "K" as the third letter, while words that begin with "K" are easily recalled, making them also more readily available in memory. Therefore, it can be concluded that words with the letter "K" in the initial position are more cognitively available to individuals, leading to the observed heuristic bias in their responses.

1.4.2 The representativeness heuristic

The representativeness heuristic can be defined as a cognitive mechanism, that underlies the formation of stereotypes, leading individuals to associate things with specific stereotypical categories based on shared characteristic similarities. These judgments are often inaccurate as they are guided by subjective rules, and they neglect rational principles such as sample size and representativeness.

A classical illustration commonly used to elucidate the representativeness heuristic, particularly the conjunction fallacy, is "Linda's problem," devised by Kahneman and Tversky (1983). This example serves as demonstration of the conjunction fallacy, as individuals tend to perceive the conjunction of two events as more likely than a single event.

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

Which is more probable?

    A. Linda is a bank teller.
    B. Linda is a bank teller, and she is active in the feminist movement

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Some participants may select option B, presuming it better aligns with the stereotype of a girl with Linda's characteristics. However, this decision lacks rationality, as the probability of two events occurring together will always be lower than or equal to the probability of a single event.

1.4.3 Anchoring and adjustment heuristic

Anchoring bias pertains to the tendency of individuals to rely on the initial information they receive and use it as a reference point, or "anchor," for forming estimates and judgments. Tversky and Kahneman elucidate this cognitive bias by claiming that, in situations of uncertainty, people adopt the anchor as a starting point and subsequently adjust their estimations based on it.

In one of their studies investigating anchoring bias, participants were presented with a randomly chosen number within the range of 0 to 100. Subsequently, they were asked to determine whether the percentage of African nations in the United Nations was higher or lower than the previously mentioned random number. The findings revealed that a majority of participants tended to use the randomly provided number as an anchor and consequently provided numerically close responses to this initial value (Tversky & Kahneman, 1974c).

1.5 Suboptimal decisions and nudge

As delineated in the previous section, human behavior often deviates from rationality, leading individuals to exploit mental shortcuts or compromises in decision-making processes to reduce cognitive effort. Unfortunately, this tendency frequently results in suboptimal choices that can have negative consequences on people's lives and society at large.

In 2008, Thaler and Sunstein authored the book "Nudge" to propose an effective strategy to aid decision-making processes. They define "nudge" as any aspect of choice architecture that could alter people's behavior without denying any options or significantly changing their economic incentives. The concept of choice architecture, introduced by the authors, refers to techniques used to present or frame alternative choices. They claim that, when presenting alternatives, it's not possible not to frame them anywise, and therefore it is essential to apply rational methods to this framing process (Thaler & Sunstein, 2008b).

An illustrative example from the book involves an American school canteen, where the arrangement of food order was being designed. The authors contended that the way food was presented to the students could influence their food choices and have an impact on their healthy selections. As designing this order could not be avoided, they

supported the importance of optimizing it. The designed nudge intervention consisted of presenting healthy food, such as vegetables, at the beginning of the food selection. As a result of this reorganization, the school canteen witnessed a 25% increase in healthy food consumption. Nudges can be applied across various domains, including economic decisions (Rubaltelli & Lotto, 2021b), pro-environmental behaviors (Goldstein et al., 2008), pro-social behaviors (Shang et al., 2008), and preventive behaviors (Cialdini, 2016).

1.5.1 Libertarian paternalism

The authors introduce the notion of "libertarian paternalism" to explain their approach to nudging. The term "libertarian" is used to signify their belief in preserving individuals' freedom to make choices according to their own preferences. On the other hand, "paternalism" denotes their willingness to influence people's behavior towards better or healthier decisions. This "paternalistic" aspect of their approach stems from the fact that individuals often lack stable and optimal preferences, and therefore could benefit from nudges, guiding them toward choices that maximize their own well-being. By using this dual concept, the authors explain their intention to redesign the framing of alternatives while still leaving the agent the independence to select their optimal personal choice. Consequently, an ideal nudge should be easily avoidable and demand minimal effort.

1.5.2 How to create good nudges

Caraban and colleagues (2019) conducted a review about nudging interventions and identified six categories of nudge mechanisms, which include the following key points: facilitate, confront, deceive, social influence, fear, and reinforce. For each mechanism, many nudging options have been developed. Some of them will be presented now.

Facilitating: The facilitating nudges aim at fighting the status quo bias. As elucidated before, it is the situation in which people are reluctant to change their current status for a new one, because of procrastination, inertia, and loss aversion.

As proved by many studies, it is possible to help people escape from this inertial status with default option nudges. For instance, Rubaltelli and Lotto (2017) designed a nudge study, aimed at increasing psychologists' contributions to their pension fund, changing the default option from 10% to 20% of their income.

Confront: this nudge technique exploits the regret aversion bias, that occurs when we make decisions for the fear of regret in the future. In this sense, it could be useful to remind one's behavior consequences during the decision-making process.

Minkus and colleagues (2015) for example, created a Facebook plugin presented to people right before picture's publication, which included children, asking the user if he's sure to proceed with the publication or if he would like to consider other options.

Deceive: this strategy works thanks to the decoy effect's mechanism. It is a tendency to choose an option between others when it is presented in a standard scenario and to change this preference when the previously chosen option is presented in comparison to an alternative with a different value.

The experimental study by Lee et. al (2011) well explains this strategy. They tried to encourage the purchasing of healthy food over snacks, presenting a big and glossy apple next to another smaller and parched one. Adding a particularly attractive option between the alternatives makes the "glow" feature of that fruit to be the most important choice feature to focus on while deciding between alternatives. In this way the apple was preferred and chosen by the majority of the participants.

Social influence: as it will be explained in the next section, when people don't have parameters to decide how to behave, they tend to refer to other's people conduct (Festinger, 1950). This technique was used Goldstein in a study, in which social information was presented as descriptive norm messages. According to the author, indeed, the concept of descriptive norm refers to "what most people do in a particular situation" and "it could motivate action by informing people of what is generally seen as effective or adaptive behavior". In his research, guests of a hotel were more motivated to act in a pro-environmental way, reusing their towels more than once, by descriptive norms messages about other guests' sustainable behaviors than by traditional environmental messages (Goldstein et al., 2008).

Fear: this approach is widely used in the marketing field and consists of designing situations in which people could perceive less availability of something, making it particularly rare, important, and desired (a feeling that could be referred to the scarcity bias (Mittone & Savadori, 2009).

Cialdini (1987) claims that decisions guided by this bias are not motivated by the fear of losing the object or opportunity themselves, but they are conducted in order to avoid the negative emotions of a loss. For example, as in flight tickets purchasing scenarios, on the websites it is possible to experience pop-up messages warning to quickly complete the purchase since there are only few seats left (Courty & Ozel, 2019).

Reinforce: these nudging interventions take advantage of environmental feedbacks to encourage behaviors in a natural way. An example is the water fountain designed by Arroyo and colleagues (2012), which aimed at reminding people to have a break and drink, thanks to attractive sounds and projected colors next to the fountain.

1.5.3 Nudge interventions examples - Road safety

Lake Shore Drive, a prominent street in Chicago known for its dangerous curves and frequent car accidents, prompted the implementation of a nudge intervention utilizing visual cues in 2006 to mitigate such incidents. In an effort to prevent crashes, a smart approach was designed to influence drivers to reduce their speed when approaching this particular road. The intervention involved the painting of a series of lines with exponentially decreasing gaps between each other. This design created a visual illusion of acceleration, inducing drivers to decelerate. The impact of this intervention on drivers' behavior was substantial, causing a remarkable 36% reduction in crashes at the North Lake Shore Drive curve within the initial six months following its installation. The success of this nudge strategy demonstrated the potential efficacy of visual cues in promoting safer driving practices and improving road safety (Thaler & Sunstein, 2008c).

1.5.4 Nudge interventions examples - Smart Program

Nudge interventions have found widespread application in guiding individuals' economic decisions, and an example is the "Save More Tomorrow" (SMART) plan, designed by Thaler and Benartzi (2004). This initiative was created in response to a significant decline in personal savings observed in the United States during the 1970s. The authors identified three primary factors contributing to this behavior.

Firstly, determining the appropriate level of savings is not intuitively evident and often it relies on individuals' financial literacy, which can vary widely. Secondly, saving implies self-control, and surveys have revealed that while people acknowledge the

advantages of saving, many admit not to have the needed willpower (Choi et al., 2001). Thirdly, individuals tend to procrastinate when faced with unpleasant and bureaucratic tasks, and the status quo bias suggests they may be reluctant to change their current financial status for an uncertain alternative (Samuelson & Zeckhauser, 1988). The prospect of exerting cognitive effort and embracing risk may prevent people from saving.

Moreover, saving money can cause a sense of loss aversion as individuals become used to a certain income level, making it difficult to increase their savings due to the perceived loss. To address these challenges, Thaler and Benartzi devised the SMART plan, aimed at fighting these barriers to saving. The plan incorporated four key elements:

1. Employees were encouraged to agree to increase their contributions to the savings plan well in advance of the actual increase.
2. When employees consented to the plan, their contributions would rise incrementally each time they received a pay raise.
3. The contribution rate would continue to grow until it reached a predetermined maximum amount.
4. Employees were granted the freedom to opt out of the program at any time.

The authors reported highly positive outcomes from the implementation of the SMART program. A substantial number of individuals who were offered the plan chose to participate, and the majority of those who enrolled in the plan continued to utilize it. Essentially, the plan leveraged the inertia and status quo bias mechanisms, which were the very factors that initially deterred people from saving.

1.5.5 Nudge interventions examples - Saving money

A similar study was conducted in Italy between 2016 and 2017 demonstrated the role that default options could have on people's economic decisions (Rubaltelli & Lotto, 2021c). The project aimed at guiding people, particularly Italian psychologists, toward smarter savings for their retirement plan. Although Italian freelance workers don't have a public pension system, they are required to contribute to a fund managed by their professional association. The contribution to this fund is mandatory, and every worker can individually choose the amount of his contribution, starting from a minimum

percentage, which was initially set at 10% of their income. The minimum results still to be too low to allow them to collect enough money for their retirement.

Hence, this study aimed at encouraging a larger contribution to the fund, keeping them free to choose the best option for their long-term interests. According to the choice architecture theory, the authors designed a nudging intervention that included three main modifications to the ENPAP website, the platform used in Italy by psychologists to manage their pension fund. They set a minimum contribution as the default option to 20%, which was also the first option on the left, and 10% the last one on the right. Furthermore, they added a pop-up message on the website, which claimed that decreased contributions to the fund would have also caused decreased pensions in the future. Finally, they allowed users to easily compare the amount of the contributions with their overall income, presenting them on the same page, in order to lower their potential loss perception during the process.

Results show that these little changes increased the percentage of income invested. Several workers indeed chose to contribute with more than 10% of their income. The default option had a great influence on their choice since 63.58% of them did not change the preselected 20% default option.

1.5.6 Nudge interventions examples - Pro-environmental behaviors

Another example of nudging intervention for pro-environmental behaviors is the one carried out by Keep Britain Tidy, an environmental charity based in the UK, which aims at reducing litter and improving local places. In 2015 they designed a program for litter reduction, inspired by the original, that was first designed and tested by Pelle Guldborg Hansen in Copenhagen in 2011.

They used the concept and power of salience, which includes all those aspects that help attract people's attention. As in Copenhagen's study, they used green footprints placed on the ground to nudge and guide people toward the closest trash bins, reducing litter left on the ground. They then analyzed the levels of litter on the ground before and after the program's implementation, finding a 15.9% reduction in the three weeks after the green footprints' installation.

1.5.7 Nudge interventions examples - Pro-social behaviors

Goswami and Urminsky (2016), indagated the role of default amounts on charitable donation behaviors. Default options are often used in nudge interventions since they could serve as suggestions, and people mostly don't opt-out from the default option because of the status quo bias mechanism and the change inertia. The aim of the study was to understand if using low amounts as default lowers the bar and influences participants' willingness to donate.

The authors conducted the experiment during the annual alumni fundraising campaign of a business school and they sent 7917 emails to prior donors who did not engage in donations that year yet. Participants were randomly assigned to the conditions of a 4 (default level: a.Low, b.Medium, c.High, d.None) x 2 (reminder about prior donation amount: No, Yes) x 2 (number of options to designate what their donation would be used for: 2, 5) full-factorial design. The default amount was presented with the label "suggested". They found that the low default option increased the donations level and participation compared to the medium and low defaults. This effect seems to be motivated by the fact that the low option makes the donor feel less guilty to donate a small amount of money, and his pro-social self-image doesn't get shattered. They can experience the same level of warm glow but with less effort (Andreoni, 1990c).

1.5.7 Nudge interventions examples - Social information

Croson and Shang (2008) indagated the role of social information in people's decisions. According to Festinger's theory, indeed, people's behavior is guided by their evaluations of reality and themselves. These judgments are made using reference points found in the environment, and for this reason, they can be considered comparison judgments.

The reference points could be objective standard or subjective standard based. In some situations, as for example, donations to the church, the objective standard would suggest that whoever donates is a generous person.

Nevertheless, there's no specific standard for the appropriate amount to donate, which could be instead derived from a subjective standard. An individual could, for example, consider himself generous if he donates to the church a similar amount as one of his friends, which represents his reference point for this specific behavior.

Furthermore, the authors of the research previously already studied and found a gender-congruent social information effect, which explains that social information designed with matching genders with the decision maker has a greater influence on the final contribution choice.

Their experiment was carried out in a public radio station in 2003 with donors of the station, whom was offered to renew their membership. The nudge intervention with social information was planned in a way that, right before asking the donor the amount they would have liked to contribute with, they were informed about the donation of another donor, which was, depending on the condition, higher or lower than the one made by the participants the year before.

The results confirm the hypothesis that social comparisons influence contributions. The direction of the donation followed the direction of the received information. Participants who received social information about higher donations contributed more than the previous years, and those who received social information about lower donations decreased their contribution.

CHAPTER TWO: HYPOTHESES AND METHODOLOGY

2.1 Hypotheses

This study delves into two main concepts, norm nudges and the order of the alternatives. Norm nudges were defined by Bicchieri and Dimant (2023) as nudges used to elicit social expectations, in order to guide people toward desirable behaviors.

As explained before, behavior is often guided by descriptive social norms, which suggest to people what is typically done in a certain situation and thus, they are functional to navigate new settings in which people could lack reference points to decide how to behave. In their work Croson and colleagues (2010) explain that descriptive norms have an impact on behavior through two mechanisms, one of them is self-focused and the other one is relationship focused. The authors claim that the first mechanism relies on our self-concept and that we behave in ways that reinforce or protect this concept. For instance, if an individual owns a "generous" self-concept, he might donate money for pro-social causes to sustain this self-concept. In this process, social norms play an important role because they suggest what is generally considered "generous."

According to the relationship-focused mechanism, instead, social norms are so important to people because they contribute to preserving relationships with the social environment. Hence, descriptive norms influence collective behavior, and they could be conveyed by social information about what other people do in specific situations. Several studies also showed that social information can contribute to influencing people, depending on the group they belong to. Hogg and Turner (1987) claimed that the largest effect on behavior comes from one's reference networks, which are made up of people who are thought to be similar to oneself in terms of ethnic group, gender, religion, or politics. Based on the literature on social norms and norm nudges, I hypothesize that:

Hypothesis 1: In spending behaviors, informing people about contributions made by others should nudge them to donate a similar or higher amount of money.

Hypothesis 2. When the gender of the person in the social information matches the participants' gender, they should donate more.

As previously discussed, the anchoring effect explains the tendency to rely on the first piece of information we receive when facing different monetary amounts in a decision-making process. Thus, modifying the order of the alternatives could be relevant for the final decision (see, Rubaltelli & Lotto, 2019). As already elaborated, they designed some strategies to increase freelance psychologists' contribution to their retirement plan. Within the intervention on the retirement plan website, they also changed the order of the alternatives, setting the percentage of contribution to the retirement plan in decreasing order from 20% to 10% (while before the intervention it was increasing from 10% to 20%). Moreover, as illustrated by the example of the school canteen from Thaler and Sunstein when thinking about how to organize the presentation of some elements, it is impossible not to set them in a specific order, thus justifying the attempt to set the order in a way that helps people behave in their best interest.

Two factors then - the anchoring bias and the left-to-right reading order - play a role in decision making processes in which people face sequences with amounts of money. In fact, when reading them starting from the left, people are more likely to focus on smaller numbers since they are presented with them initially. On the other hand, when reading alternatives in decreasing order, people begin reading from the left, as before, but this time they are more likely to anchor to the high amounts since they notice them first, which leads to more spending or contribution.

Hence, I hypothesize that:

Hypothesis 3: When facing decreasing (vs. increasing) amounts of money, people should anchor to higher (vs. lower) values and consequently spend more money.

2.2 Method

2.2.1 Participants

Four hundred and thirty-eight Italian participants took part in the study. Nevertheless, only fully completed surveys were included in the analyses. Hence, the final sample included two hundred and seventy-one participants (38% female; mean age = 40, ranging from 19 to 84). Data were collected between May and June 2023, and participants were recruited through snowball sampling. The survey was spread on social media platforms through Facebook pages and instant messaging (e.g.,

WhatsApp and Telegram). Facebook and Instagram posts with the link to the survey could be shared and messages included the request to share the survey to facilitate the snowball sampling process. All participants included in the final sample gave their consent to participate in the study.

2.2.2 Materials and procedure

Participants were presented with an online questionnaire that lasted about 8 minutes. The survey included three different scenarios within subjects covering these topics: pro-social, pro-environmental and gift-giving behaviors. After a brief introduction about the fictitious scenario, participants were asked to choose the amount of money they would have liked to spend for a donation to children in need, for a renewable energy supply, or for a birthday gift to a friend. In each scenario, one of the monetary amounts included a nudge in the form of the social information regarding the amount of money spent by another person, a man or a woman depending on the condition. Moreover, participants' attention was directed toward this piece of information by the presence of a red arrow. Furthermore, depending on the condition, the monetary amounts were presented in either an increasing or a decreasing order.

Thus, scenarios were manipulated according to a 2 (social norm: man vs. woman behavior) x 2 (order of monetary amounts: increasing vs. decreasing) within subjects design. The man or woman described in the social information could match or not match the gender of the participants, determining "matching-genders" and "non-matching genders" conditions. The monetary amounts were either increasing ("increasing condition") or decreasing ("decreasing condition") leading participants to read first the lower amounts or the higher ones.

After each scenario, participants were asked to rate the benefits of their decision on a 10-point scale from 1 ("Not beneficial at all") to 10 ("Extremely beneficial"), the costs on a 10-point scale from 1 ("Not costly at all") to 10 ("Extremely costly"), and the perceived impact on a 7-point scale from 1 ("No impact at all") to 7 ("Very large impact"). In addition to these questions, in the pro-social scenario, participants were asked to answer questions about the warm glow (Caserotti et al., 2019), that is, how good they felt about giving to the cause, on a 7-point scale from 1 ("Not good at all") to 7 ("Very good"), and about the perceived efficacy (Lindauer et al., 2020), reporting how much they felt their decision could make a difference helping the children on a 5-

point scale from 1 ("No difference") to 5 ("Huge difference"). In the pro-environmental scenario, participants were additionally requested to rate their environmental concern using three items of a dedicated scale (Maibach et al., 2014). In the gift-giving scenario, participants also needed to report their feelings about the decision they made on a 10-point scale from 1 ("Not good at all") to ("Very good"). Finally, participants were also asked to report some demographic information regarding age, gender, income, education, and political orientation. The scales for costs, benefits and feelings were developed ad hoc.

CHAPTER THREE: RESULTS

3.1 Descriptive statistics and correlations

It emerged that, according to the first hypothesis, men donated the highest amount of money in decreasing matching conditions in all three scenarios (M=3.93, SD=2.59), (M=4.00, SD=2.67) (M=5.59, SD=2.98). This also happened for female participants in the pro-environmental and gift-giving scenarios (see Table 1).

Descriptive statistics also provide interesting information about the dependent variables of perceived costs, benefits, and impact. In the decreasing matching conditions, in the pro-social and pro-environmental scenarios, the highest donation (M=3.93, SD=2.59 - M=5.32, SD=2,76) was made by male participants, and it was also the condition in which they reported the highest benefits levels (M=6,85, SD=2,41, M=7.56, SD=1,69).

Furthermore, results indicate that the highest donation made by women (M= 3.33, SD=2.56, M=4.08 SD=2.23) matched the highest reported perceived costs (M=4.00, SD=2.50, M=4.56, SD=2.58) in the pro-social and gift-giving scenarios in decreasing conditions.

In the pro-social and pro-environmental scenarios (M=3.93, SD=2.59), (M=5.32, SD=2,76), the highest amount of money donated, that in this case was the one donated by women in the decreasing non-matching condition, also corresponded to the condition in which women perceived the highest level of impact for their donations (M=3.70, SD=1.61, M=4.79, SD=1.75).

Correlations were run on the overall sample and then independently for the increasing and decreasing conditions and within each of these conditions independently for each social information condition: man and woman.

Increasing. In the increasing conditions of the pro-environmental behavior the donated amount of money positively correlated with the benefits if the social information was referred to a man (See Table 2). Furthermore, regardless from the gender of the social information, in the pro-social scenario benefits always had a positive correlation with the warm glow.

On the other hand, in the pro-environmental conditions, benefits were always positively correlated with the impact, and in the gift-giving conditions they were always positively correlated with the participants' feelings.

Decreasing. In the pro-social scenario in the conditions in which the donations' alternatives were decreasingly ordered the amount of money positively correlated with benefits and warm glow, regardless of the social information's gender (See Table 3).

Benefits were also always positively correlated with the impact and the efficacy in the pro-social scenarios and with feelings in the gift-giving scenarios.

Table 1. Descriptive statistics

	Up man		Up Woman		Down man		Down woman	
	Male	Female	Male	Female	Male	Female	Male	Female
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Money PS	2.41 (2.35)	2.15 (1.58)	3.38 (3.46)	2.38 (2.01)	3.93 (2.59)	3.33 (2.56)	1.88 (1.45)	2.58 (2.02)
Money PE	3.03 (1.59)	3.20 (2.07)	3.10 (3.03)	3.10 (2.31)	4.00 (2.67)	4.79 (2.91)	5.32 (2.76)	4.69 (2.44)
Money G	3.34 (2.00)	2.85 (0.864)	3.90 (1.87)	3.02 (1.20)	5.59 (2.98)	3.70 (1.61)	3.52 (1.58)	4.08 (2.23)
Benefit PS	5.66 (2.48)	6.33 (2.46)	6.10 (2.62)	6.62 (2.32)	6.85 (2.41)	6.28 (2.17)	5.72 (3.13)	5.58 (2.12)
Benefit PE	6.69 (2.74)	6.93 (2.40)	7.52 (2.18)	7.14 (2.43)	7.04 (2.71)	7.70 (2.30)	7.56 (1.69)	7.14 (2.31)
Benefit G	8.07 (1.39)	6.60 (2.22)	6.95 (2.20)	7.52 (1.97)	7.15 (2.30)	8.05 (1.77)	7.32 (1.49)	6.83 (1.90)
Cost PS	3.38 (2.38)	3.40 (2.23)	3.19 (2.23)	3.94 (2.29)	3.89 (2.65)	4.00 (2.50)	3.44 (2.63)	3.64 (2.37)
Cost PE	4.55 (2.63)	4.58 (2.43)	4.29 (2.33)	4.72 (2.73)	4.85 (2.30)	4.63 (2.36)	4.40 (2.18)	5.03 (2.32)
Cost G	4.17 (2.30)	4.05 (2.34)	4.52 (2.42)	4.54 (2.12)	4.37 (2.56)	4.47 (2.51)	4.64 (1.96)	4.56 (2.58)
Impact PS	3.38 (1.54)	3.45 (1.48)	3.10 (1.61)	3.48 (1.58)	3.93 (1.82)	3.70 (1.61)	2.40 (1.53)	3.66 (1.38)
Impact PE	3.97 (1.57)	4.68 (1.41)	4.43 (2.09)	4.26 (1.76)	3.93 (1.94)	4.79 (1.75)	3.84 (1.97)	4.33 (1.33)

Table 2. Correlations between the main study variables in the increasing conditions (Women social info in the bottom left side and men social info in the top right side of the correlation matrix)

	MoneyPS	MoneyPE	MoneyG	BenefitPS	BenefitPE	BenefitG	CostPS	CostPE	CostG	ImpactPS	ImpactPE	Warmglow	Efficacy	Feelings1	Feelings2
1		0.08	0.21	0.12	0.03	0.10	0.16	-0.15	-0.19	0.06	0.03	0.17	0.12	0.04	0.09
2	0.26		0.00	0.00	0.34**	-0.12	0.02	0.15	0.11	-0.16	0.24	-0.01	-0.18	0.01	-0.02
3	0.31**	0.37**		0.03	-0.18	0.16	-0.24	0.08	-0.24	-0.36**	0.02	0.04	-0.01	-0.05	0.23
4	0.26*	0.10	0.02		0.26*	0.18	0.10	0.27*	0.11	0.29*	0.07	0.66***	0.48***	0.35**	0.22
5	0.20	0.27*	0.18	0.25*		0.15	0.20	0.33**	0.26*	0.32**	0.54***	0.20	0.12	0.25*	0.20
6	0.31**	0.16	0.24*	0.33**	0.01		0.17	0.14	0.10	-0.13	0.03	0.29*	-0.07	0.70***	0.75***
7	0.04	-0.11	-0.11	0.21	-0.10	0.16		0.06	0.53***	0.11	0.14	0.01	-0.04	0.17	0.25*
8	-0.14	0.01	-0.18	-0.08	0.11	-0.23	0.36**		0.24*	0.01	0.09	0.09	0.02	0.21	0.05
9	-0.22	0.06	0.07	0.09	-0.01	0.12	0.59***	0.37***		0.26*	0.19	-0.03	0.04	0.19	0.18
10	0.05	-0.04	-0.09	0.38**	0.45***	0.00	0.28*	0.20	0.29*		0.25*	0.27*	0.44***	0.18	-0.16
11	-0.12	0.17	0.01	0.00	0.13	-0.10	0.08	0.23	0.33**	0.48***		0.14	0.13	-0.01	0.13
12	0.24*	-0.08	-0.10	0.71***	0.28*	0.33**	0.24*	-0.10	0.13	0.41***	0.06		0.39***	0.35**	0.26*
13	-0.04	-0.02	-0.02	0.50***	0.23	-0.04	0.09	0.06	0.17	0.46***	0.17	0.29*		0.06	-0.09
14	0.31**	0.28*	0.18	0.34**	0.08	0.60***	0.15	-0.03	0.13	0.05	0.04	0.26*	0.16		0.61***
15	0.20	0.27*	0.16	0.07		0.68***	-0.05	-0.16	0.04	-0.11	-0.06	0.01	-0.06	0.65***	

Table 3. Correlations between the main study variables in the decreasing conditions (Women social info in the bottom left side and men social info in the top right side of the correlation matrix)

	MoneyPS	MoneyPE	MoneyG	BenefitPS	BenefitPE	BenefitG	CostPS	CostPE	CostG	ImpactPS	ImpactPE	Warmglow	Efficacy	Feelings1	Feelings2
1		0.52***	0.53***	0.19	0.08	-0.06	0.14	0.02	0.01	-0.02	-0.06	0.31**	0.08	0.08	-0.03
2	0.06		0.30*	0.16	0.21	0.03	0.15	0.14	0.05	-0.10	0.18	0.09	0.02	0.22	0.10
3	0.19	-0.03		0.20	-0.08	0.08	0.17	-0.11	0.08	0.04	-0.16	0.27*	0.11	0.15	0.03
4	0.29	-0.15	0.00		0.39***	0.28	0.06	-0.10	-0.22	0.33**	0.08	0.63***	0.43***	0.30*	0.13
5	-0.03	0.35**	-0.09	0.28*		0.24*	0.05	-0.11	-0.10	0.14	0.40***	0.42***	0.20	0.38**	0.31**
6	-0.26*	0.07	-0.13	0.13	0.30		0.03	-0.07	0.05	0.04	-0.02	0.19	-0.05	0.82***	0.75***
7	-0.08	0.07	-0.08	0.06	-0.04	-0.05		0.41***	0.48***	0.24*	0.15	0.20	0.01	0.04	0.05
8	0.21	0.14	0.17	0.11	-0.04	-0.20	0.50***		0.42***	0.16	0.13	-0.11	0.06	-0.16	-0.01
9	-0.05	-0.04	0.13	-0.08	-0.13	-0.12	0.45***	0.43***		0.01	0.17	-0.08	-0.27*	0.10	0.04
10	0.29*	-0.11	0.02	0.36**	0.10	0.00	0.30*	0.14	0.04		-0.32**	0.49***	0.29*	0.06	-0.01
11	0.07	0.20	0.02	0.00	0.08	0.22	0.31*	0.30*	0.05	0.50***		0.10	-0.04	0.01	0.13
12	0.30	-0.12	0.06	0.55***	0.02	0.11	0.20	-0.06	0.04	0.38**	0.04		0.28*	0.24*	0.18
13	0.27*	-0.31*	0.14	0.62***	0.15	0.07	0.13	-0.10	-0.07	0.58***	0.03	0.57***		-0.01	0.01
14	-0.18	-0.10	-0.20	0.37**	0.29*	0.60***	-0.14	-0.08	-0.17	0.12	0.17	0.08	0.21		0.66***
15	-0.14	0.04	0.06	-0.02	-0.01	0.63***	0.01	-0.06	-0.22	-0.11	0.14	-0.05	-0.06	0.44***	

3.2 Regressions

Regression analyses were run to test the hypotheses of the study, according to which participants' donations in pro-social, pro-environmental, and gift-giving scenarios could be influenced by social information about the donation: either same gender as the participant (ingroup) or different gender (outgroup) and by the order of the alternatives.

3.2.1 Pro-social behavior

Regression analyses were used to test the second and third hypotheses, following which, participants' donations could be influenced by the gender of the person in the social information and by the direction of the presented money alternatives (decreasing or increasing). To pursue this aim, several models were used, with the direction of the money, the gender of the social information and their interactions as predictors while also controlling for the effect of costs and benefits and the warm glow.

The most predictive model included the interaction of the direction of money and social information, the interaction between gender and benefits and gender and costs, and the warm glow as predictors of the donated amount of money.

As predicted in the third hypothesis, the results showed a significant effect of the decreasing direction of money on the decision of the amount of money to donate (see Table 4). Moreover, the gender, the benefits, and the warm glow predicted the amount of donated money.

In addition, the model revealed significative interactions between the decreasing direction of money and the social information, and between the gender and the benefits.

Table 4. Regression analysis for pro-social behavior

Predictors	B	SE	t	p	95% CI
(Intercept)	-0.74	.68	-1.09	0.277	[-2.09 – 0.60]
Dir money [Decreasing]	1.19	.37	3.21	**0.001**	[0.46 – 1.92]
SocComp [Woman]	0.45	.36	1.22	0.222	[-0.28 – 1.18]
Gender2 [Female]	1.94	.80	2.40	**0.017**	[0.35 – 3.53]
Benefits	0.22	.09	2.42	**0.016**	[0.04 – 0.40]
Costs	0.15	.08	1.74	0.082	[-0.02 – 0.33]
Dir money [Decreasing] × SocComp [Woman]	-1.55	.53	-2.89	**0.004**	[-2.60 – -0.50]
Gender2 [Female] × Benefits	-0.26	.11	-2.37	**0.018**	[-0.48 – -0.04]
Gender2 [Female] × Costs	-0.18	.11	-1.56	0.118	[-0.40 – 0.05]
Warm glow	0.27	.10	2.67	**0.008**	[0.07 – 0.48]

These two interactions were further investigated. As shown in Figure 1 and in line with the second and the third hypothesis, when the social information described men, higher amounts of money were donated in the decreasing conditions than in the increasing ones. Hence, the direction of money moderated the effect that the social information has on the donation.

The significative interaction between benefits and gender was supported by a slope (Figure 2), which showed that as perceived benefits increased, donations by male participants increased as well (see table n with statistics slope analysis men), whereas this did not happen when participants were females (see table n with statistics slope analysis women). Thus, the gender moderated the effect of the benefits on the donation.
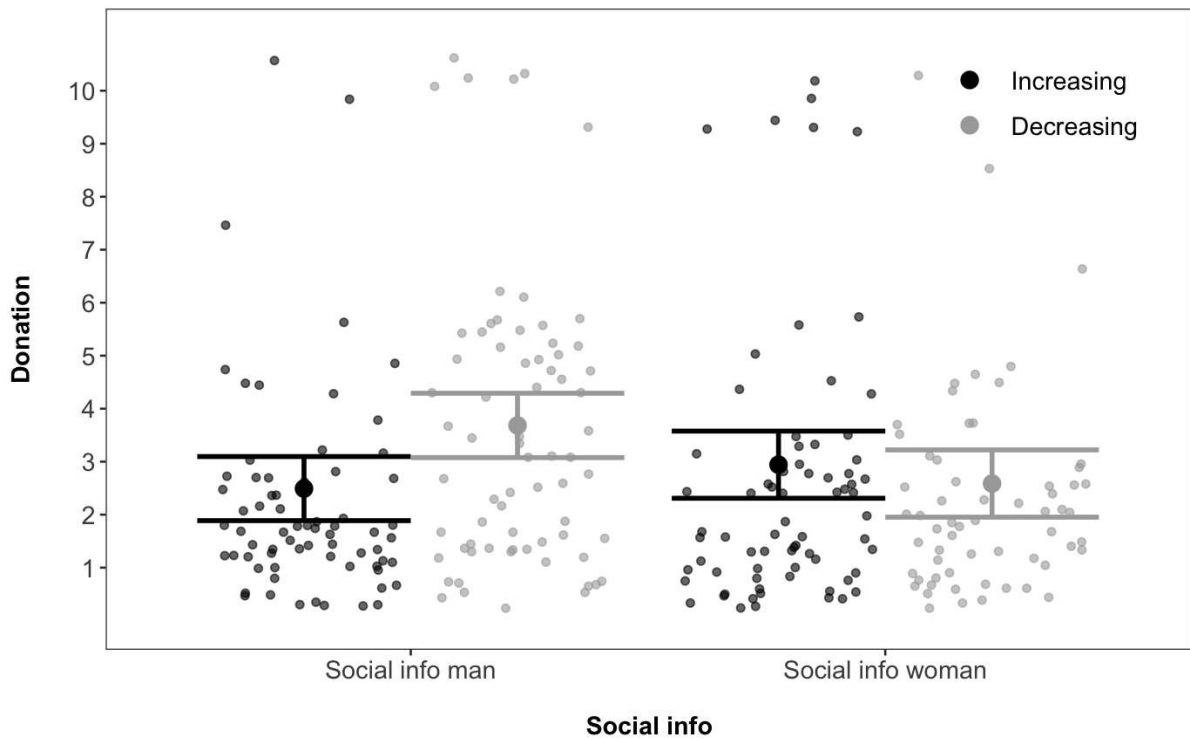
Figure 1. Donated money depending on the interaction between social information and direction of the donations' alternatives.
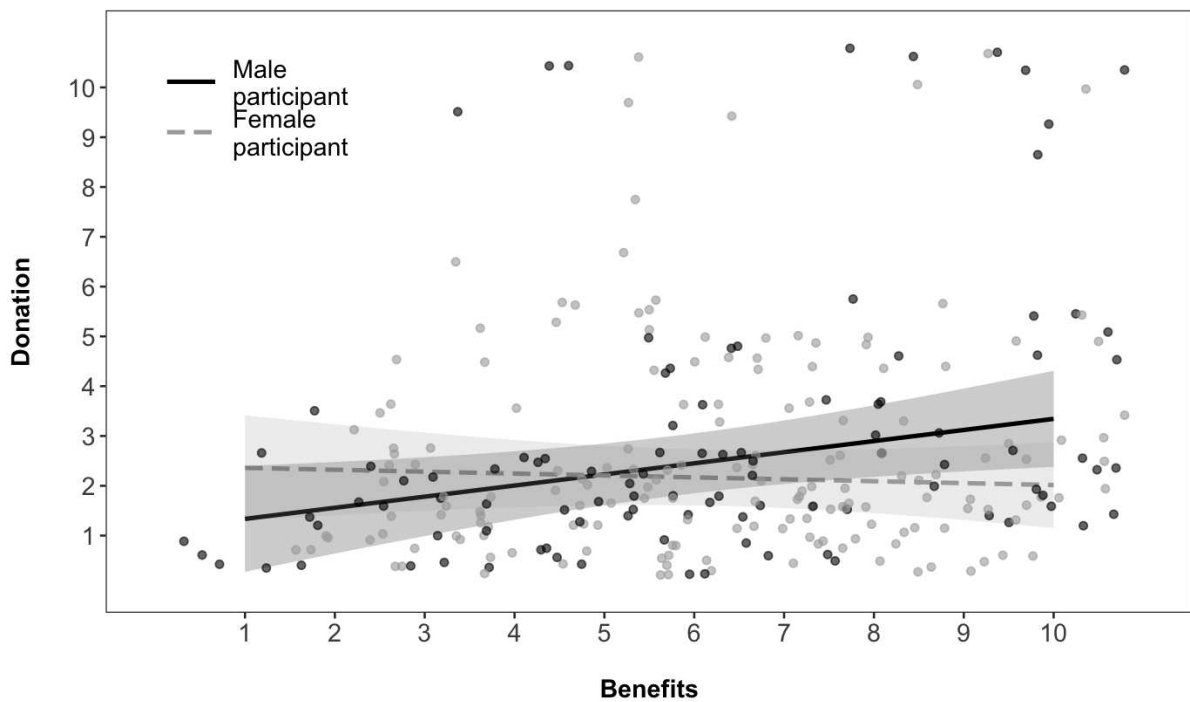

Figure 2. Slope for donated money depending on the interaction between gender and benefits.

3.2.2 Pro-environmental behavior

The most predictive regression model, run to analyze the pro-environmental behavior, included the direction of money, the social information and their interaction, the costs and benefits, and the impact as predictors of the donation.

The model showed that the direction of money and the benefits perceived by the participants had a significant effect on the donated money (see Table 5). Indeed, as shown in Figure 3, in line with the third hypothesis, in the pro-environmental scenarios, participants tended to donate more in the decreasing conditions.

Table 5. Regression analysis for pro-environmental behavior

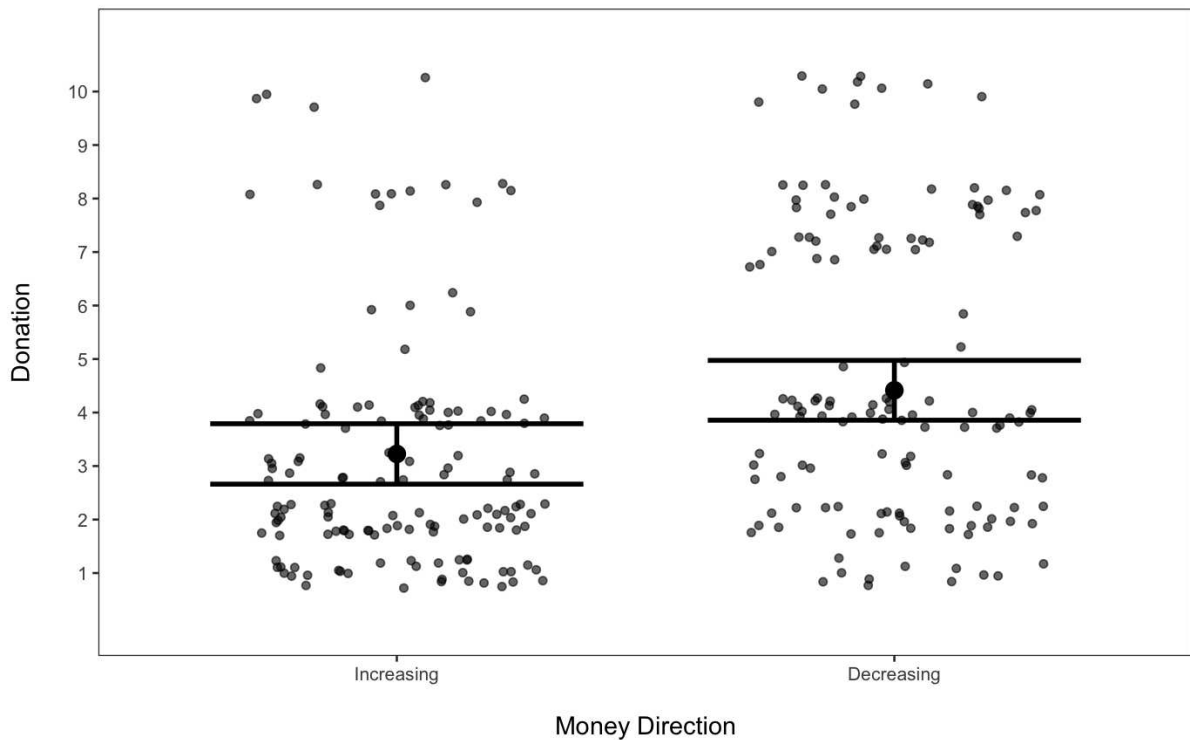| Predictors	B	SE	t	p	95% CI
(Intercept)	0.61	.58	1.03	0.304	[-0.55 – 1.76]
Dir money [Decreasing]	1.19	.40	0.00	**0.004**	[0.39 – 1.99]
SocComp [Woman]	-0.14	.40	0.73	0.731	[-0.93 – 0.65]
Benefits	0.25	.06	0.00	**<0.001**	[0.12 – 0.38]
Costs	0.07	.06	0.28	0.280	[-0.05 – 0.19]
Dir money [Decreasing] × SocComp [Woman]	0.66	.57	0.25	0.256	[-0.48 – 1.80]
Impact	0.12	.09	0.18	0.187	[-0.06 – 0.31]

Figure 3. Donated money depending on the direction of donations' alternatives.

3.2.3 Gift-giving behavior

To investigate people's donation behavior in the gift-giving scenario, a regression model was used to test the hypotheses. It shed light on the predictive role that the three-way interaction between the direction of money, the social information, and the gender, could have on the dependent variable.

As expected, the results showed that the direction of money and its interaction with the social information and the gender had a significant effect on the main dependent variable, the money spent by the participants (See Table 6).

Furthermore, the second and third hypotheses were confirmed, indeed, Figure 4 shows that in the conditions in which alternatives were decreasingly ordered, men spent more when the social information was referred to a man.

Table 6. Regression analysis for gift-giving behavior

| Predictors	B	SE	t	p	95% CI
(Intercept)	3.34	.33	9.97	**<0.001**	[2.68 – 4.00]
Dir money [Decreasing]	2.25	.48	4.65	**<0.001**	[1.30 – 3.20]
SocComp [Woman]	0.56	.51	1.08	0.280	[-0.46 – 1.58]
Gender2 [Female]	-0.49	.44	-1.12	0.262	[-1.36 – 0.37]
Dir money [Decreasing] × SocComp [Woman]	-2.63	.72	-3.65	**<0.001**	[-4.05 – -1.21]
Dir money [Decreasing] × Gender2 [Female]	-1.40	.62	-2.24	**0.026**	[-2.63 – -0.17]
SocComp [Woman] × Gender2 [Female]	-0.39	.64	-0.60	0.545	[-1.66 – 0.88]
(Dir money [Decreasing] × SocComp [Woman]) × Gender2 [Female]	2.85	.91	3.12	**0.002**	[1.05 – 4.64]
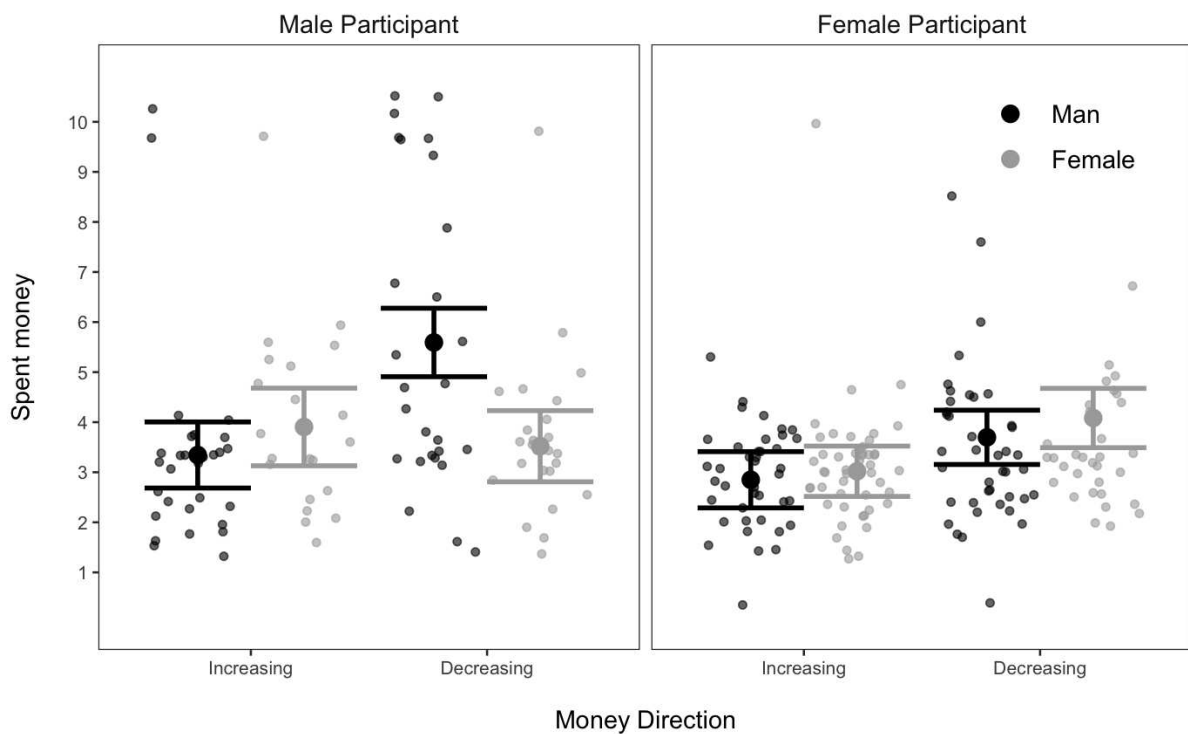
Figure 4. Interaction between gender, social information, and direction of monetary amounts on the choice of how much to spend.

CHAPTER FOUR: DISCUSSION

The aim of this study was to design nudge interventions and investigate their influence on pro-social, pro-environmental and gift-giving behaviors. In the study, participants were presented with three potential scenarios, a pro-social donation, a pro-environmental donation, and a gift-contribution. They were asked to make a decision about the amount of money they would have spent. The nudge intervention included three main elements, a label located below the donations' amounts with social information about the money donated by another person (either a man or a woman), a red arrow pointing at the money donated by this person, and the direction in which the monetary amounts were presented (either decreasing or increasing).

First, it was found that informing people about the amount of money spent by others nudges them toward a similar or even higher contribution. This result is in line with the literature, as, for instance, is stated in the Social Comparison Theory (Festinger, 1954). According to this theory, people assess their social and personal value depending on comparisons they make with other people, because of a drive to evaluate opinions and abilities. Furthermore, Cialdini's studies support the idea that people's behavior is guided by their perception of what most others do. He defines this concept as descriptive social norm, and he claims that it is conveyed to people through social information about what is considered as more adaptive to do in a specific setting. Moreover, these results are consistent with previous research, which demonstrated the efficacy of providing people with social norm messages, reminding them to pay taxes (Hallsworth et al., 2017), or motivating them to reduce their electricity consumption (Allcott, 2011).

Second, results demonstrated that the gender of the person reported in the scenario had an effect on the decision. Indeed, in gift-giving scenarios, participants contributed with more money in the matching gender conditions. This finding confirms the identity congruency effect first theorized and tested by Shang and colleagues (2008) in pro-social behaviors. Nevertheless, in this study the effect was only found in the gift-giving behaviors. In the pro-social and pro-environmental behaviors, instead the finding was not replicated.

Third, in all three scenarios, decreasingly ordered alternatives had an impact on the money spent by the participants. This influence is in line with the anchoring effect, which explains that people tend to rely on the first information they are provided with and use it as reference point. Hence, since people in Western countries reads from left to right, it is reasonable to conclude that, in the decreasing conditions, participants have been nudged to anchor on higher amounts of money compared with those in the increasing conditions.

Furthermore, it was observed that other dependent variables, such us benefits, impact and warm glow predicted the behavior. Descriptive statistics indeed, illustrated that in the pro-social and pro-environmental scenarios the highest amount of donated money corresponded to the conditions in which women perceived the highest levels of impact for their donations. This result is in line with previous studies, which attested the effect that perceived impact of donations can have on generosity (Cryder et al., 2013) and that people are less likely to donate when they think that their donation will have a low impact on helping the cause (Fetherstonhaugh et al., 1998).

Additionally, it was discovered that perceived benefits had a significant effect on the donations in the pro-social and pro-environmental behaviors but only for the male participants. Indeed, in the pro-social conditions as perceived benefits increased, donations by male participants increased as well. This difference between male and female participants may depend on the fact that the sample was unbalanced because of the number of uncomplete surveys that led to a smaller number of participants than originally planned.

Similarly, in the pro-environmental conditions results show that the benefits perceived by the participants have a significant effect on the donated amount of money. This effect had already been tested in prior research, which investigated both the roles of costs and benefit in pro-social behavior, hypothesizing that subjective judgements of the donor about costs and benefits influence the final decision of the donation (Caserotti et al., 2019).

Finally, in line with several studies demonstrating the importance of warm glow as motivator of pro-social behavior (Andreoni, 1990b; Crumpler & Grossman, 2008). In

the pro-social conditions, this finding was replicated, and warm glow predicted the donation amounts.

In this study the efficacy of nudging on three different behaviors was tested. Nevertheless, testing each of them separately could lead to more specific results and expand the literature of each specific topic. The study's subjects were, indeed, examined for all three behaviors. As a result, participants' responses may have been influenced because after the first scenario, they may have altered them based on the preceding scenarios. Furthermore, because of a familiarization process, the effect of the red arrow and the social information may have lost some of their nudging power while going from the first to the last scenario. Therefore, examining each behavior independently in a between-subjects research or in distinct studies might be helpful in preserving the effect of nudges on participants. Moreover, a larger sample size could be useful in obtaining more reliable and representative results.

Finally, a red arrow was used after each scenario, to exert participants' attention toward the amount of money chosen by others (social information). Despite that, it did not represent the default option itself since it was a suggestion but not a preselected option. This could have reduced the nudging power of the intervention. Thereby, the impact of a nudging intervention could be further studied by manipulating the presence of nudges to see whether individuals make different decisions in presence or absence of a nudge. Indeed, past research has shown that default alternatives, from which people should actively opt out, can lead to socially beneficial behaviors (Johnson & Goldstein, 2003b; Hansen et al., 2019; Madrian & Shea, 2001b). Hence, future studies could exploit the study design of this research, using the social information as proper default option, from which participant could decide to opt out.

The findings of this study regarding the function of social information, the effect of the decreasing and increasing order of alternatives, and default options may have application in a variety of real-world nudging intervention contexts. For instance, these effects can be used to build more strategic fundraising efforts for environmental and social causes. Indeed, focusing on the framework and structure is a phase that cannot be avoided in the planning process for effective projects and campaigns. Therefore, improving their design through future studies can aid achieving more consistent and ambitious goals, aimed at supporting social and environmental concerns.

References

Andreoni, J. (1990). Impure altruism and donations to public goods: A theory of Warm-Glow giving. *The Economic Journal*, 100(401), 464-477.

Allcott, H. (2011). Social norms and energy conservation. *Journal of Public Economics*, 95(9-10), 1082–1095.

Arroyo, E., Bonanni, L., & Valkanova, N. (2012). Embedded interaction in a water fountain for motivating behavior change in public space. *In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems.* ACM, 685–688.

Bell, D. E., Raiffa, H., & Tversky, A. (Eds.). (1988). *Decision making: Descriptive, normative, and prescriptive interactions*. cambridge university Press.

Bernoulli, D. (2011). Exposition of a new theory on the measurement of risk. In *The Kelly capital growth investment criterion: Theory and practice* (pp. 11-24).

Bicchieri, C., & Dimant, E. (2023). Norm-Nudging: Harnessing Social Expectations for Behavior Change. *Available at SSRN*.

Caraban, A., Karapanos, E., Gonçalves, D., & Campos, P. (2019, May). 23 ways to nudge: A review of technology-mediated nudging in human-computer interaction. In *Proceedings of the 2019 CHI conference on human factors in computing systems* (pp. 1-15).

Caserotti, M., Enrico Rubaltelli, & Slovic, P. (2019). How decision context changes the balance between cost and benefit increasing charitable donations. *Judgment and Decision Making,* 14(2), 187–198.

Hama, A. (2010). The invisible gorilla: and other ways our intuitions deceive us. *The Journal of Social, Political and Economic Studies*, *35*(4), 537-543.

Choi J, Laibson D, Madrian B, Metrick A, David A. Wise. "For Better or For Worse: Default Effects and 401(k) Savings Behavior" [Internet]. In: Perspectives in the Economics of Aging. *University of Chicago Press*; 2004 p. 81-121.

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current Directions in Psychological Science*, 12(4), 105–109.

Cryder, C., Loewenstein, G., & Scheines, R. (2013). The donor is in the details. *Organizational Behavior and Human Decision Processes*, 120(1), 15–23.

Croson, R., & Shang, J. (2008). The impact of downward social information on contribution decisions. *Experimental Economics*, 11(3), 221–233.

Croson, R. T., Handy, F., & Shang, J. (2010). Gendered giving: the influence of social norms on the donation behavior of men and women. *International Journal of Nonprofit and Voluntary Sector Marketing, 15*(2), 199-213.

Crumpler, H., & Grossman, P. J. (2008). An experimental test of warm glow giving. *Journal of Public Economics*, 92(5-6), 1011–1021.

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist*, 49(8), 709–724.

Festinger, L. (1950). Informal social communication. *Psychological Review*, 57(5), 271–282.

Festinger, L. (1954). A Theory of Social Comparison Processes. *Human Relations, 7(2), 117–140.*

Festinger, L. (1978). Rationality as Process and as Product of Thought. *The American Economic Review,* 68(2), 1–16.

Fetherstonhaugh, D., Slovic, P., Johnson, S., & Friedrich, J. (1997). Insensitivity to the value of human life: A study of psychophysical numbing. *Journal of Risk and uncertainty*, *14*, 283-300.

Goldstein, N. J., Cialdini, R. B., & Vladas Griskevicius. (2008). A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. *Journal of Consumer Research*, 35(3), 472–482.

Goswami, I., & Urminsky, O. (2016). When should the Ask be a Nudge? The Effect of Default Amounts on Charitable Donations. *Journal of Marketing Research*, 53(5), 829–846.

Hallsworth, M., List, J. A., Metcalfe, R., & Ivo Vlaev. (2017). The behavioralist as tax collector: Using natural field experiments to enhance tax compliance. *Journal of Public Economics*, 148, 14–31.

Hogg, M. A., & Turner, J. C. (1987). Social identity and conformity: A theory of referent informational influence. *Current issues in European social psychology*, *2*, 139-182.

Johnson, E. J., & Goldstein, D. G. (2003). Do defaults save lives? *Science*, 302(5649), 1338–1339.

Daniel, K. (2017). *Thinking, fast and slow*.

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–291.

Kahneman, D., & Tversky, A. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review*, 90(4), 293–315.

Krueger, J. I., Evans, A. M., & Goldin, G. (2011). The Tangled Web of Rationality [Review of Rational Choice in an Uncertain World: The Psychology of Judgment and Decision Making, by Reid K. Hastie and Robyn M. Dawes]. *The American Journal of Psychology,* 124(2), 247–251.

Lindauer, M., Mayorga, M., Greene, J. D., Slovic, P., Västfjäll, D., & Singer, P. (2020). Comparing the effect of rational and emotional appeals on donation behavior. *Judgment and Decision Making*, 15(3), 413–420.

Maibach, Edward & Leiserowitz, Anthony & Rosenthal, Seth & Roser-Renouf, Connie. (2014). *Climate Change in the American Mind.*

Madrian, B. C., & Shea, D. F. (2001). The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior. *Quarterly Journal of Economics*, 116(4), 1149–1187.

Mittone, L., & Savadori, L. (2009). The Scarcity Bias. *Applied Psychology,* 58(3), 453–468.

Pascal Courty, & Ozel, S. (2019). The value of online scarcity signals. *Information Economics and Policy,* 46, 23–40.

Pelle Guldborg Hansen, Schilling, M., & Malthesen, M. (2019). Nudging healthy and sustainable food choices: three randomized controlled field experiments using a vegetarian lunch-default as a normative signal. *Journal of Public Health*, 43(2), 392–397.

Robert B Cialdini. 1987. *Influence*. Vol. 3. A. Michel Port Harcourt.

Rubaltelli, E., & Lotto, L. (2021). Nudging freelance professionals to increase their retirement pension fund contributions. *Judgment and Decision Making,* 16(2), 551–565.

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty*, 1(1), 7–59.

Shang, J., Reed, A., & Croson, R. (2008). Identity Congruency Effects on Donations. *Journal of Marketing Research*, 45(3), 351–361.

Simon, H. A. (1990). Invariants of Human Behavior. *Annual Review of Psychology,* 41(1), 1–20.

Simon, H. A. (1997). *Models of bounded rationality: Empirically grounded economic reason* (Vol. 3). MIT press.

Simon, H. A. (1978). Rationality as Process and as Product of Thought. *The American Economic Review*, 68(2), 1–16.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. Journal of Experimental Psychology, 18(6), 643–662.

Minkus, T., Liu, K., & Ross, K. W. (2015, May). Children seen but not heard: When parents compromise children's online privacy. In *Proceedings of the 24th international conference on World Wide Web* (pp. 776-786).

Thaler, R. H., & Benartzi, S. (2004). Save More TomorrowTM: Using Behavioral Economics to Increase Employee Saving. *Journal of Political Economy,* 112(S1), S164–S187.

Thaler, R. H., & Sunstein, C. R. (2008). Nudge: improving decisions about health, wealth, and happiness. *Choice Reviews Online*, 46(02), 46–0977.

Todd, P. M., & Gigerenzer, G. (2007). Environments that make us smart: Ecological rationality. *Current directions in psychological science,* 16(3), 167-171.

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases. *Science*, 185(4157), 1124–1131.

Tversky, A., & Kahneman, D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review,* 90(4), 293–315.

Von Neumann, J., & Morgenstern, O. (2019). Theory of games and economic behavior. *In American Mathematical Society eBooks* (pp. 163–167).