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THE ROLE OF NUDGES IN DECISION MAKING

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ABSTRACT

The impact of nudges on decision-making has been explored in many contexts of socio-economic interest, revealing the effectiveness in influencing people's behavior. The present study investigates experimentally the effect of three types of nudges in the decision making of people regarding health-related questions. A total of 189 participants were randomly assigned to one of three distinct treatments. Treatment A served as the control group, while treatments B and C manipulated the architecture of the choices, without modifying the actual choice. The findings corroborate the ability of nudges to dramatically yet non-intrusively and cheaply modify human behavior. Although our survey experiment does not precisely replicate real-world conditions, it offers insights for policymakers into the potential of nudges to enhance decision-making in practical scenarios.

LABURPENA

*Nudge*k erabakiak hartzean duten eragina interes sozioekonomikoko testuinguru askotan aztertu izan da, eta pertsonen portaeran eragiteko duten eraginkortasuna frogatu da. Azterlan honek esperimentalki ikertzen du hiru *nudgek* zer eragin duten pertsonek osasunarekin lotutako galderei buruz erabakiak hartzeko orduan. 189 parte-hartzaileei ausaz esleitu zitzaien hiru tratamendu desberdinetako bat. A tratamenduak kontrol-talde gisa balio izan zuen; B eta C tratamenduek, berriz, aukeren arkitektura manipulatu zuten, benetako aukeraketa aldatu gabe. Lortutako emaitzek berretsi dute *nugde*k giza portaera errotik aldatzeko duten gaitasuna, modu ez intrusiboan eta merkean. Gure inkesta-esperimentua ez da mundu errealean gerta litekeen egoera baten pare-parekoa, baina *nudge*k agertoki praktikoetan erabakiak hobeto hartzeko duten ahalmenari buruzko ideiak eman ahal dizkie agintariei.

RESUMEN

El impacto de los *nudges* en la toma de decisiones se ha explorado en muchos contextos de interés socioeconómico, revelando su efectividad para influir en el comportamiento de las personas. El presente estudio investiga experimentalmente el efecto de tres tipos de *nudges* en la toma de decisiones de las personas con respecto a preguntas relacionadas con la salud. Un total de 189 participantes fueron asignados aleatoriamente a uno de tres tratamientos distintos. El Tratamiento A sirvió como grupo de control, mientras que los tratamientos B y C manipularon la arquitectura de las opciones sin modificar la elección real. Los hallazgos corroboran la capacidad de los nudges para modificar drásticamente, de manera no intrusiva y económica, el comportamiento humano. Aunque nuestro experimento de encuesta no replica con precisión las condiciones del mundo real, proporciona ideas para los responsables de políticas sobre el potencial de los *nudges* para mejorar la toma de decisiones en situaciones prácticas.

TABLE OF CONTENTS

1. INTRODUCTION

Behavioral economics plays a crucial role in today's government policy-making by providing insights into how individuals make decisions and behave in real-world situations. The integration of behavioral economics into policy design recognizes that people often deviate from the rational behavior assumed in traditional economic models. In many countries, behavioral economics have been employed in diverse areas such as highway safety, environmental protection, consumer protection, national security, and healthcare (Sunstein and Reisch, 2018).

By considering the psychological aspects of decision-making, policymakers can design interventions that are more likely to achieve the desired outcomes. Behavioral economics can contribute to policies aimed at improving public welfare, health, and safety. By understanding how individuals perceive risks, make health-related decisions, or respond to incentives, policymakers can develop strategies to encourage positive behaviors and discourage harmful ones.

Nudges have become a very important tool for implementing such interventions to enhance public welfare without limiting people’s freedom of choice or involving monetary incentives. Nudges can influence individual behavior in a subtle and non-coercive manner, they focus on changing the decision-making environment rather than relying on heavy regulatory measures or financial incentives. This makes them particularly appealing when resources are limited.

In this study, we analyze the effectiveness of nudges to influence human behavior in several situations. We first categorize nudges into several types. In the case of three types, we illustrate their application and usefulness in policies that the Basque government has already implemented. To test the others, we design and conduct an online survey experiment. Since the real-life examples mostly target health-related issues, the experiment also implements most questions related to healthcare, an area where the use of nudges might make a difference. The experimental results are analyzed statistically, using regression analysis.

Our results show that, when nudged, experimental subjects indeed change their behavior in line with nudge theory, while the behavior contrasts starkly with classic economic theory. In particular, we show that nudges, which should have no impact on fully rational decision-makers, can enhance blood and organ donations, framing can drive the choices toward certain alternatives, and setting default might enhance willingness or resistance to provide information.

We thus conclude that, although our survey experiment is not a perfect simulation of a real-world environment, it could inform policy-makers about the further potential of nudges, improving the choices of people in real-life scenarios. The experimental evaluation of nudge effectiveness particularly illustrates how it is possible to influence people's behavior without constraining their freedom of choice.

2. LITERARY REVIEW

2.1. CLASSICAL ECONOMIC THEORY

The classical economic approach centers around the concept of the economic man, *Homo Economicus*, characterized as a rational, unemotional, and utility-maximizing individual. This theory, widely embraced by social scientists and economists, rests on three key assumptions. Firstly, it posits that individuals exhibit rationality and excel in solving straightforward conditional logic tasks. Secondly, it asserts that decision-making is rooted in self-interest, implying that individuals are inherently selfish, and their choices prioritize personal benefit. Lastly, it suggests that people's thoughts and beliefs are molded by new information.

It was not until the late 1970s that an alternative perspective started to emerge in economics, challenging the traditional theory. Substantial experimental evidence accumulated, and numerous articles, including "Judgment under Uncertainty: Heuristics and Biases" by Tversky and Kahneman (1974), highlighted systematic deviations from the predictions of rational decision-makers in the thought processes of ordinary individuals. These deviations were attributed to cognitive mechanisms rather than emotional interference. Experts began examining how human behavioral tendencies influenced decision-making in diverse economic situations, acknowledging the impact of these tendencies on people's reactions.

2.2. BEHAVIOURAL ECONOMICS

These emerging tendencies were grounded in psychological assumptions that were deemed more logical than those underpinning the neoclassical concept of rationality. By the 1990s, these ideas began to be labeled as "behavioral models" (Congiu and Moscati, 2022). These models posit that individuals make systematic errors due to psychological blind spots, challenging the notions of rationality, stability, and selfishness inherent in classical theories.

From these models, a new field of economics emerged known as Behavioral Economics, which amalgamates insights from psychology and economics to explore phenomena in markets where agents exhibit human limitations and complexities (Mullainathan and Thaler, 2000). Behavioral Economics investigates and delineates economic decision-making, taking into account deviations and biases from traditional economic models.

In recent years, theories from Behavioral Economics have gained prominence in economic policy analysis and formulation. Numerous governments and private companies have adopted behaviorally informed policies, with a particular emphasis on "Nudges." The following section elucidates the fundamentals of nudge theory and highlights a few of the most significant nudges.

2.3. THE NUDGE THEORY

A nudge is defined as "any aspect of the choice architecture that alters people's behavior predictably without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid" (Thaler and Sunstein, 2008, page 8). The term "Nudge" gained popularity in 2008 through the work of behavioral economist Richard Thaler and legal scholar Cass Sunstein, particularly in their book titled "Nudge: Improving Decisions About Health, Wealth, and Happiness."

For a policy to qualify as a nudge, it must encompass three main components. Firstly, it should not forbid or limit any options, as nudges aim to preserve freedom of choice. Restricting choices or forbidding certain options would disqualify an intervention as a nudge. Nudges should not cause significant harm to the individual being nudged; their purpose is to facilitate better behavior by altering the presentation of options and making the preferred choice attractive and easy.

The second component involves maintaining or not significantly altering economic incentives. Policies that involve adding taxes or providing subsidies for specific choices are not considered nudges. While such interventions might effectively influence behavior, if they impose a substantial material cost, they do not align with the concept of a nudge. The term "Libertarian Paternalism" was coined to describe the philosophy underlying the first two tenets of this theory.

Libertarian Paternalism, the philosophy behind nudges, represents a relatively weak, soft, and nonintrusive form of paternalism. It does not block, fence off, or burden choices significantly but aims to influence choices in a way that enhances the well-being of the individuals making those choices. Libertarian paternalism seeks to make it easy for people to follow their preferred path without imposing burdens on those who wish to exercise their freedom (Thaler and Sunstein, 2008, page 6), leading to the third fundamental aspect of nudges.

The third key factor of a nudge is that it must be easy and inexpensive to avoid. The individual being nudged should find it easy to resist the nudge, meaning they should have the ability to easily choose an alternative option. However, this third point sparks a debate about transparency. The conditions that make a nudge "easy and cheap to avoid," particularly its transparency and ability to prompt deliberation, are often violated (Congiu and Moscati, 2022). If the goal is to preserve freedom of choice and make it easy to avoid the nudge, the individual being nudged must somehow be aware of its existence.

As a consequence, nudges differ from traditional public policies, which typically rely on bans and commands, as they are not an imposition of rules that must be strictly followed. Nudges, or at least their intended nature, should be less restrictive and more cost-effective than typical economic policies and interventions. Over the past decade, numerous countries have adopted the practice of incorporating behavioral insights into their policies. Mongin and Cozic (2018) characterize nudges in the policy-making

context as welfare-promoting interventions aimed at mitigating the adverse effects of rationality failures.

To develop public policies that enhance overall welfare, some governments have established dedicated teams, commonly referred to as nudge units. The Behavioural Insights Team (BIT, henceforth), initiated by the UK government in 2010, was the pioneer in this field, followed by the White House Social and Behavioral Sciences Team (SBST), launched in the USA in 2014. The SBST's objective was to translate insights from behavioral science research into enhancements in federal policies and programs (Congdon and Shankar, 2015). By 2015, Australia, Singapore, Germany, and Italy had also established behavioral teams within their central governments. Even the European Commission announced the creation of a behavioral unit within the Commission's Joint Research Unit.

Various areas where behavioral science has played a crucial role in policy decisions across many nations include highway safety, healthcare, environmental protection, consumer protection, cigarette smoking, national security, tax policy, poverty, retirement, and more (Sunstein and Reisch, 2018, page 5). Although each country has adopted its unique approach to policy development, most of them employ similar instruments, namely nudges. The design of these nudges often adheres to the EAST framework (developed by the BIT in 2014), which emphasizes making policies Easy, Attractive, Social, and Timely.

While private companies have been at the forefront of leveraging psychological expertise to engage with their customers, resulting in numerous examples of nudges in private practices, this investigation primarily focuses on the relationship that public administrations have with the use of nudges, particularly within the healthcare sector. Despite the absence of a dedicated nudge unit in the Spanish and Basque governments and public administrations, some measures or strategies they have implemented could be identified as nudges.

2.3.1. TYPES OF NUDGES

In this section, I will present six significant and widely-used types of nudges, following a classification by Sunstein (2014). The first three nudges (Simplification or reduction of obstacles, reminders, and implementation of intentions) will be accompanied by real-world examples where these measures have been successfully implemented. The remaining three nudges (Setting up a default choice, framing, and partitioning) will be explored through a brief explanation of how they operate, and their effectiveness will be examined through a survey experiment.

A. REDUCTION OF OBSTACLES

Minimizing the effort required from individuals can significantly increase the likelihood of desired behaviors. The key lies in simplifying the process, ensuring ease of participation with minimal psychological transaction costs. Often, facilitating good behavior involves removing small obstacles rather than forcefully directing individuals in a specific direction (Thaler and Sunstein, 2008).

One effective method of reducing obstacles is by providing individuals with the necessary tools to carry out a task. For instance, in the Colorectal cancer screening program, Osakidetza, the Basque Health Service, enhances participation by sending a kit to everyone insured by them, aged between 50 and 69, and residing in the Basque Autonomous Community. The kit comprises an envelope with an invitation letter and a small plastic tube for collecting a stool sample. This kit is sent every two years to eligible individuals for screening.

The act of sending the plastic tube and clear instructions on labeling it directly contributes to increased participation rates. According to information from the Spanish Network of Cancer Screening Programs in their 2019 Colorectal Cancer Screening Indicators, the Basque Country and Navarre demonstrated the highest participation rates in the program at 72.3% and 73.6%, respectively. In contrast, the Balearic Islands, Andalusia, and Castilla la Mancha exhibited lower participation rates of 34.97%, 35.01%, and 37.68%, respectively. Notably, in the former two regions, the kit was delivered to participants' homes, while in the latter three examples, patients had to collect the tube from a health center or pharmacy.

While various factors may contribute to the differences in participation rates mentioned above, the proven effectiveness of reducing obstacles and simplifying tasks suggests a potential impact in this case as well. The tangible action of making tasks more accessible likely influenced the higher participation rates observed in regions where the kit was sent directly to participants' homes.

B. ELICIT IMPLEMENTATION OF INTENTIONS

Encouraging individuals to plan and specify how they will execute a task can significantly increase the likelihood of task completion, closing the gap between intentions and actual behavior. This nudge involves assisting people in planning their responses to events, enhancing the likelihood of translating intentions into actions.

In a notable experiment conducted by Milkman, et al. (2011), participants received reminder mailings for vaccination clinics. Some were prompted to write down the date they planned to be vaccinated, while others were asked to specify both the date and time. The results showed a meaningful impact: the vaccination rate for the control group was 33.1%, while those prompted to write down just a date had a 1.5 percentage point increase, and those specifying both date and time experienced a 4.2

percentage point increase, statistically significant and of substantial magnitude. This experiment illustrates how a simple, low-cost prompt can significantly influence task achievement.

In the Autonomous Community of the Basque Country, the "Programme for the Early Detection of Breast Cancer" (PDPCM) has been in place since 1995, targeting women aged 50 to 69. To ensure high participation in the Breast Cancer Early Detection Programme and increase rates of detection, the program employs the nudge of eliciting implementation of intentions.

This nudge is executed by sending each eligible participant a personalized letter specifying the date, time, and hospital for their mammography appointment. By doing so, the program presets the future intentions of the patient, relieving them of the burden of planning when and at what time to attend. The psychological transaction cost is minimal, and participants are assured that if they cannot make the scheduled appointment, another letter will be sent in 2-3 months. Crucially, this method, while effectively nudging individuals towards desired behavior, maintains individual autonomy as attendance is not mandatory, respecting the freedom of choice (although the program informs individuals that they will continue receiving invitations as long as they remain eligible). This approach aligns with the concept of a "nudge" as it encourages desired behavior at minimal expense without restricting individual autonomy (Milkman, et al., 2011). Unfortunately, we do not have data to assess the effectiveness of this policy in the Basque Country.

C. REMINDERS

Reminders serve as an effective nudge to prompt individuals into action, recognizing that people often contend with a myriad of thoughts and commitments. In situations where inaction may be attributed to inertia, procrastination, competing obligations, or simple forgetfulness, reminders via email, text messages, or apps can influence behavior and assist individuals in completing desired tasks (Sunstein, 2014).

In the context of healthcare, a pertinent example is the reminder system employed by "Euskadiko Odol Emaileak," the Basque blood donors program, for regular blood donors. Eligible individuals, aged 18 to 65, weighing over 50 kilograms, and in good health, can donate blood multiple times a year based on gender and health status. The program encourages donors to download their app after the first donation.

Through the app, donors can register their last blood donation, and the system automatically sends personalized reminder notifications when they are eligible to donate again. In addition to app notifications, the program employs SMS messages to remind all previous blood donors about the significance of their contributions. These messages provide details about the specific times and locations where the donation bus will be available in the upcoming days.

This proactive use of reminders not only leverages technology to streamline the blood donation process but also reinforces the importance of regular blood donation. By employing personalized notifications and SMS messages, the program effectively nudges individuals towards continued participation in blood donation, addressing potential barriers such as forgetfulness and competing priorities.

In Section 3, we describe an experiment that evaluates the effectiveness of another nudge type to increase blood donation. If successful, our experiment might enrich and complement the above-described implementation of nudges in this area.

D. DEFAULT

Default options are pre-set courses of action that come into effect if a decision maker does not take action (Thaler and Sunstein, 2008). This nudge is particularly effective in situations characterized by inertia or uncertainty in decision-making. People often exhibit a status quo bias, preferring to maintain the current state of affairs. Default options capitalize on this bias by suggesting that the preselected option is the administrator's preference, prompting individuals to adhere to it without the effort of evaluating other options (Gigerenzer, 2015). Setting a default choice reduces individuals' mental load, and many appreciate the ease of going along with the pre-selected option.

While default rules are proven to be highly effective nudges, ethical discussions have arisen regarding the true impact of defaults on autonomy and freedom of choice. Nudges, including defaults, are designed to preserve autonomy, but if individuals are unaware of alternative choices or the cost of changing from the default is too high, the nudge may infringe upon freedom of choice (Johnson, et al., 2012).

To mitigate autonomy concerns, one approach is to set the default to the alternative that most people prefer when making an active choice in the absence of any default. However, even well-intentioned defaults can influence preferences and outcomes. The challenge arises from inertia, as individuals may not reject defaults, even if they are potentially harmful. This situation poses a risk to autonomy because individuals may end up with outcomes they did not specifically choose (Sunstein, 2015). Although people have the option to opt-out and reject the default choice, some defaults impose burdens that are challenging to avoid, especially when individuals are not well-informed about the implications of the preselected choice. Balancing the effectiveness of defaults with the need to respect autonomy remains a key consideration in the ethical application of this nudge.

In our experiment presented in Section 3, we test the effectiveness of defaults in stimulating or preventing people from revealing their more personal health-related information. If proven effective, the use of defaults could be considered in other areas of healthcare such as blood or organ donation as well.

E. FRAMING

The framing effect posits that individuals may react differently to the same information based on how it is presented or expressed. According to Thaler and Sunstein (2008), the presentation of a choice can influence people's feelings about it, consequently altering their behavior. Framing can manifest in two ways: equivalence frames, where logically equivalent options are presented differently, leading to a change in preferences due to phrasing, and emphasis frames, which influence preferences based on the intentional emphasis of different aspects of a statement (Druckman, 2001).

The framing effect is evident in the presentation of information in either a positive or negative frame. A subtle change in phrasing can shift the perception of the message, causing individuals to subjectively categorize it as either a gain or a loss. Tversky and Kahneman (1984) observed that people tend to perceive losses as more significant than gains of the same magnitude, leading to the concept of loss aversion. Consequently, negative framing is often perceived as a greater loss than positive framing of the same magnitude (Sharma, et al., 2021). Loss aversion explains why individuals, depending on the framing of identical information, may alternate between being risk-averse and risk-seeking.

In an effort to prove the framing nudge, we conducted an online survey experiment, varying the phrasing of two logically identical alternatives to examine if individuals perceive the information differently. The primary hypothesis posits that choices involving gains tend to be associated with risk aversion, whereas choices involving losses tend to be associated with risk-taking, as demonstrated by Tversky and Kahneman's (1981) experiment, also known as the "Asian disease problem". In summary, framing refers to how different phrasings of the same fundamental issue can significantly alter its meaning for respondents (Zaller, 1992). The experiment seeks to provide empirical evidence supporting the impact of framing on individuals' decision-making processes.

F. PARTITIONING

Choice architecture refers to the context in which individuals make decisions, acknowledging that the surrounding context can significantly influence thinking and decision-making processes. When behavioral changes occur due to some aspect of the choice architecture, individuals are considered to have been nudged (Quigley, 2013). Essentially, a nudge is an element of choice architecture. The presentation of choices plays a crucial role in decision-making, and choice architects are responsible for designing this architecture. Despite the desire for choices to be presented in a "neutral" way, there is no such thing as neutral architecture—any presentation of

choices will impact how the decision-maker chooses (Johnson et al., 2012). The design of choices serves as a powerful tool to influence people's behavior.

A key consideration for choice architects is the number of alternatives or choice options presented. Balancing two criteria is essential: increasing the number of options enhances the chances of providing a preference match for the consumer, but it also imposes a greater cognitive burden due to the need to evaluate more options (Johnson, et al., 2012).

Offering more options provides decision-makers with a greater opportunity to express their preferences or make choices that align with their situation. In these cases, as we will see in Sections 4.1 and 4.2, the partitioning of the dichotomous yes/no answers into more specific options will have an impact on the behavior of the decision maker. However, it introduces the obstacle of choice overload—more options can lead to overwhelm and increased psychological transaction costs. On the other hand, limiting choices encourages decision-makers to delve deeper into each option, considering them more thoroughly due to the reduced number. Yet, this approach may also result in context-dependent preferences, where the decision is influenced not only by the value of the individual option but also by the other options presented in the choice set.

3. EXPERIMENTAL DESIGN

This section presents an experiment designed to test the effectiveness of partitioning, framing, and defaults in choices related to healthcare issues.

3.1. EXPERIMENTAL METHODOLOGY

The research methodology employed is the online survey experiment, which involves conducting an experiment within the framework of an online survey. This approach combines the strengths of both survey methods and experimental methods. Surveys provide an effective means of generalizing sample findings to a larger population, while experiments allow for the exploration of causal mechanisms. Therefore, survey experiments offer the dual advantage of enabling generalization to a broader population and assessing whether observed differences are influenced by the implemented treatment.

In this specific survey experiment, participants are randomly assigned to various experimental conditions while keeping one variable constant. The objective is to observe how the intervention, in this case, the implementation of nudges, influences the study's outcomes. The control group is exposed to control questions, representing the fixed variables, and their responses will later be compared with those of the treatment group. This comparison aims to determine the extent to which the implementation of specific nudges has an impact on the outcomes.

3.2. RECRUITMENT

The online survey experiment was conducted as an online representative survey, gathering responses from around 200 participants. Respondents were primarily contacted through WhatsApp, where they received a link to one of the three versions of the questionnaire (A, B, C).

The sample is designed to encompass a diverse range of profiles, welcoming individuals of all ages and genders to participate. While the survey is open to participants of varying demographics, an expectation is set for a higher representation from individuals between the ages of 20-25 and 50-55. This anticipation recognizes potential trends in the age distribution of respondents while maintaining an inclusive approach to capture insights from a broad spectrum of participants.

3.3. DESIGN OF THE EXPERIMENT

As previously mentioned, this survey experiment aims to assess the effectiveness of three distinct nudges. Firstly, the partitioning nudge focuses on varying the number of choice alternatives presented for each question. Secondly, the framing nudge involves formulating the same information in different ways to observe changes in people's perceptions. Lastly, the default choice nudge explores how individuals respond to a preselected option, either opting out or opting in.

Table 1. Survey questions

SECTION 1

1. What is your age?
2. Select your gender
    a. Woman
    b. Man
    c. Other

SECTION 2

QUESTION 1: BLOOD DONATION: Would you ever consider donating blood?

VERSION A	VERSION B	VERSION C
a. Yes b. No	a. Yes, I consider it to be a selfless act of kindness b. Yes, but only if I got monetary retribution c. Yes, but only if it is to give a relative or a friend d. No	a. Yes b. No, I don't have an interest in donating c. No, I have a medical condition that prevents me from donating d. No, my religion / morals do not allow me to donate

QUESTION 2: ORGAN DONATION: Would you ever consider donating <u>one of your kidneys</u> to a stranger in need?

VERSION A	VERSION B	VERSION C
a. Yes b. No	a. Yes, I consider it to be a selfless act of kindness b. Yes, but only if I get monetary retribution c. Yes, if my health condition is adequate for it d. No	a. Yes b. No, I don't have an interest in donating c. No, I have a medical condition that prevents me from donating d. No, my religion / morals do no allow me to donate

QUESTION 3: THE DISEASE: Imagine you are in charge of choosing between 2 vaccines to fight a disease that has spread in your country and is expected to kill 600 people.

Model A

a. If you choose vaccine A, 200 people will be saved.
b. If you choose vaccine B, there is a ⅓ probability that 600 people will be saved and ⅔ probability that no people will be saved.

Model B

a. If you choose vaccine A, 400 people will die.
b. If you choose vaccine B, there is a ⅓ probability that nobody will die and ⅔ probability that 600 people will die.

QUESTION 4: DEFAULT CHOICE: (Default option in bold in the options)

VERSION A: Active chooser	VERSION B: OPT-OUT	VERSION C: OPT-IN
The next section contains more personal and sensitive questions, by clicking "accept" you consent to keep answering the questions, and your responses will be used by the investigator. a. Accept b. Reject	The next section contains more personal and sensitive questions, by clicking "accept" you consent to keep answering the questions, and your responses will be used by the investigator. **a. Accept** **b.** Reject	The next section contains more personal and sensitive questions, by clicking "accept" you consent to keep answering the questions, and your responses will be used by the investigator. **a. Reject** b. Accept

<u>SECTION 3</u>

1. Have you ever experienced a mental health condition? (ie. Anxiety, Depression, Eating disorders…).
   a. Yes
   b. No
2. Have you ever received treatment for an STD?
   a. Yes
   b. No

Table 1 summarizes the structure of the experiment. To conduct this experiment, different versions (A, B, C) of the same survey will be created using the "Google Forms" application. The survey will be organized into three sections. The first section, identical to all versions, will consist of two questions categorizing individuals by age and gender.

The second section, pivotal to the investigation, will include four questions incorporating the nudges under examination: partitioning (with low and high stakes), framing, and default. For the first two questions, Question 1 and Question 2, version A will feature two responses (Yes/No), while the other two models will offer four response choices; version B will have three positive responses (Yes…), while version C will only have one positive response and the rest will consist on negative responses (No...) The main question is how this decomposition of yes/no options affects choices. Regarding the framing nudge, which will be proven in question 3, questions will remain consistent across all models, but the answers will be formulated differently. For half of the participants, the choices will be positively framed, while for the other half of them, the same information will be presented but it will have a negative frame to it. To test the default nudge, question 4 simply asks whether people are willing to answer some more personal questions. In this case, questions, as well as answer options will be the same in all three treatments. However, each version will have a different preselected option. One-third of participants (Version B) will have "accept" as the preselected option, requiring them to opt-out if they disagree. Another third (Version C) will have "reject" as the predetermined option, prompting them to opt-in and click "accept" if they wish to counter the preselection. The remaining third (Version A), the control group, will have no preselected options, they will be considered the active choosers).

The third and final section will feature two personal questions related to health issues, to be answered only by participants who have not opted out (Version B) or have opted in (Version C). The responses to these questions are not the primary focus; rather, they serve to demonstrate the effectiveness of the incorporated nudges in the preceding section.

4. EXPERIMENTAL HYPOTHESIS

4.1. PARTITIONING. LOW STAKES

Hypothesis 1: Following the classical economic approach, there should be no significant change in the percentages of individuals responding to "yes" and "no" questions in version A compared to those answering the same questions in version B or C of the survey, where the answer options are broken down.

Hypothesis 2: In line with the philosophy behind partitioning, the percentage of "Yes..." answers and the percentage of "No..." answers in Models B and C, respectively, will be higher than those in Model A. Breaking down the answer options provides deeper insights into respondents' opinions on the matter. Dichotomous scales ("yes" or "no") offer precise data but lack nuance in respondents' answers (Birkett, 2023). Breaking down the answers measures more specific attitudinal responses and may lead

to behavioral changes, as the availability of more options encourages respondents to reflect more thoroughly on potential answers and the underlying reasons for their stance on the proposed question.

4.2. PARTITIONING. HIGH STAKES

Hypothesis 1: Similar to the previous question, there should be no significant change in the percentages of individuals responding to "yes" and "no" questions in version A compared to those answering the same questions in versions B or C, where the answer options are broken down.

Hypothesis 2: According to the partitioning tool considering the number of alternatives participants are presented with, the percentage of "Yes..." answers and the percentage of "No..." answers in versions B and C, respectively, will be higher than those in version A. Despite being essentially the same as the previous hypothesis, an additional consideration arises. While logically, partitioning would suggest a similar or increased effect, there is a suspicion that this nudge may have either no effect or a diminished effect compared to the previous one.

The rationale behind potential null effects lies in the clear and strong opinions individuals hold regarding the matter at hand. A notable shift in the perceived importance of blood donation compared to kidney donation is observed. People tend to have more profound opinions on organ donation, making them more likely to adhere to their attitudes rather than being influenced by the nudge. When stakes are high, nudges often exhibit less impact.

Several factors contribute to understanding why kidney donation is a more significant commitment than blood donation, leading to stronger opinions and reduced susceptibility to nudges. Firstly, there is a clear medical distinction: blood donation is a quick process lasting at most 30 minutes, with minimal recovery issues, while kidney donation involves surgery and a recovery period of up to six weeks.

Additionally, the prevalence of blood transfusions and the daily need for blood make the issue more personal to a broader audience, increasing the likelihood of individuals knowing someone in need or requiring blood themselves. This personal connection prompts a greater inclination to consider behavior change. Conversely, the specificity of kidney donation to a stranger diminishes the personal connection, making individuals less likely to be swayed by the nudge, especially given the substantial commitment involved in kidney donation.

4.3. FRAMING

Hypothesis 1: Following the classical economic approach, both the "a" and "b" options for each version of the questionnaire are effectively identical, and therefore, they should receive the same number of responses.

Hypothesis 2: The framing nudge posits that the phrasing of answers can influence responses. This particular question in the questionnaire on framing is derived from Tversky and Kahneman (1981). Their experiment demonstrated how logically equivalent phrases can lead individuals to alter their preferences, a phenomenon later termed the equivalency effect (Tversky and Kahneman, 1987).

The main hypothesis in this case is that choices between gambles and a sure thing vary based on whether the outcomes are framed as gains or losses. The framing experiment reveals that risk-averse and risk-seeking preferences are not fixed to reality; preferences for the same objective outcomes reverse with different formulations.

Choices involving gains tend to be risk-averse, while choices involving losses lean towards risk-taking. This leads to the expectation that in version A, more people will opt for the certainty of saving 200 lives rather than the risky prospect with an equal expected value in the second option—a ⅓ chance of saving 600 lives. Conversely, in version B, more individuals are anticipated to favor the ⅔ chance that 600 people will die over the certain death of 400 people.

4.4. DEFAULT

Hypothesis 1: According to the classical approach, humans are rational and calculating, and as such, they would choose for themselves rather than adhering to the preselected choice, which may not always align with their true intentions.

Hypothesis 2: The nudge theory posits that humans are likely to stick with the default rule that has been set up simply because it requires less thought and effort than actively making a choice. The psychology behind the effectiveness of this nudge is primarily the force of inertia.

In this context, respondents with "accept" as their preselected choice (Version B) are anticipated to adhere to that option rather than opting out of responding to the more personal or sensitive questions. Conversely, participants with "reject" as their preselected choice (Version C) might choose to stick with the preselected option instead of opting in to answer the additional questions. Version A of the questionnaire serves as the control group; participants randomly assigned this version will not have any options preselected and will need to actively choose their preferred option. The responses gathered from this group will assist in determining the participants' actual preferred choice when none of the options are preselected, providing a representative measure of their true preferences.

5. RESULTS

5.1. SAMPLE DESCRIPTION

Table 2 summarizes the number of observations and gender and age composition in our experiment as a whole and treatment by treatment. The survey experiment consisted of a sample size of 189 people, from which 59 responded to version A, 67 of them responded to version B, and version C was responded to by 63 participants. The average age of the whole sample is 37.08, but the average age of the respondents varies from version to version. Version A's average age was 39.66, version B's was 31.75, and version C's was 40.35. As we can see, version A and version B have on average significantly older respondents.

108 out of the 189 respondents were female (57.14%), 47.46% of version A's respondents were female, as well as 61.19% of version B's respondents, and 61.90% of version C's respondents. When considering the language in which each participant responded to the survey, 35 of the participants responded to the English version, 77 responded to the Basque version and 78 people responded to the Spanish version of the survey.

Table 2. Sample description

	N	AVERAGE AGE	FEMALE	Female (%)
A	59	39.66	28	47.46
B	67	31.75	41	61.19
C	63	40.35	39	61.90
	189	37.25	108	57.14

5.2. DESCRIPTIVE STATISTICS

To evaluate the effectiveness of the nudges, we analyzed responses to the four questions incorporating these nudges: low stake partitioning, high stake partitioning, framing, and default. Each survey item was presented as a yes/no, a/b, or accept/deny question, and responses were coded as binary outcomes (1= yes, a, accept; 0= no, b, reject) for analysis (See table A1).

Questions 1 and 2: Partitioning, low and high stakes

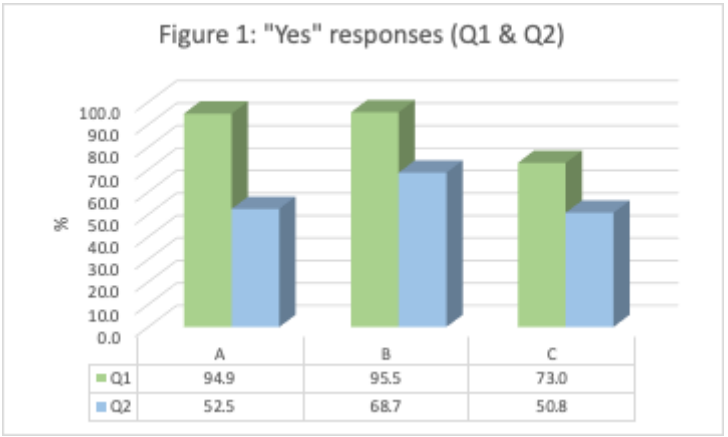
Figure 1 illustrates the fraction of people selecting the positive answer in Questions 1 and 2, separated for the treatments, A, B, and C. It shows the impact of partitioning the dichotomous answer (yes/no) into more specific responses on the number of affirmative and negative responses in each survey version. Remember that

participants responding to version A had only "yes" and "no" as choices, serving as our control group for comparison with versions B and C, where instead of having the dichotomous answer, participants had four decomposed answer choices to choose from. For question 1 regarding the likelihood of donating blood, 94.9% responded positively, while for question 2, asking about the willingness to donate an organ to a stranger in need, only 52.5% answered affirmatively. These percentages highlight that when stakes are lower (donating blood), more individuals are inclined to answer "yes" compared to higher stakes situations (donating an organ).

When comparing treatment A with B and C, the impact of the nudge becomes evident. In reference to version B, positive responses increased by 0.6 percentage points for question 1 and saw a substantial 16.2 percentage point increase for question 2. This indicates that partitioning the "yes" answer into more specific choices motivated participants to respond more positively. Through this nudge, the choice architect can effectively steer decision-makers toward more desirable behavior, such as increasing the number of individuals willing to donate blood or organs.

Conversely, examining the results of version C reveals the opposite trend. When the choices were partitioned by showing more "no" options, individuals tended to select "yes" less frequently. The count of "yes" answers decreased by 21.9 percentage points from version A to version C for question 1, and there was also a 1.7 percentage point decrease for question 2. In this scenario, the choice architect aimed for a decrease in the number of people willing to donate blood or organs. To achieve this, the partitioning was structured to break down the "no" answer into more specific "no" options while retaining the "yes" answer as the sole positive choice.

Figure 1: The fractions of subjects selecting option yes in Questions 1 and 2



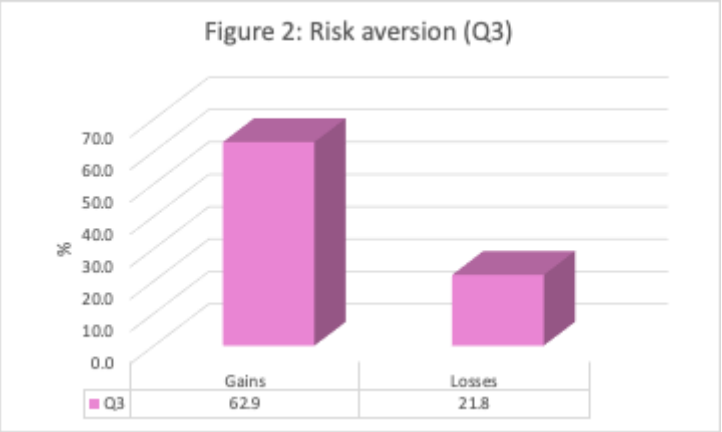
Question 3: Framing

The framing nudge proves effective when a different formulation of the same information influences the behavior of decision-makers. In this scenario, instead of being classified as version A, B, or C respondents, participants were assigned to two distinct treatments. Some respondents' choices were framed in gains, representing the

number of people that would be saved, while the remaining participants' choices were framed as losses, indicating the number of people that would die. As demonstrated in Tversky and Kahneman's experiment (1981), decisions between gambles and certain outcomes vary depending on whether the outcomes are perceived as positive or negative. People tend to exhibit greater risk aversion when information is presented in terms of gains and are more inclined to take risks when the information is framed in losses.

As depicted in Figure 2, 62.9% of participants subjected to positive framing—where responses were formulated as the number of people to be saved—opted to be risk-averse, choosing the sure thing over the gamble. In contrast, when the information was presented as lost lives, only 21.8% of participants chose the sure thing over the gamble. When deaths were framed as a certain outcome, individuals preferred to take the risky option rather than accepting the certainty of 400 deaths. Conversely, when 200 saved lives were presented as a sure thing, people preferred to stick with the assurance of lives saved rather than taking the gamble and risking more lives being lost.

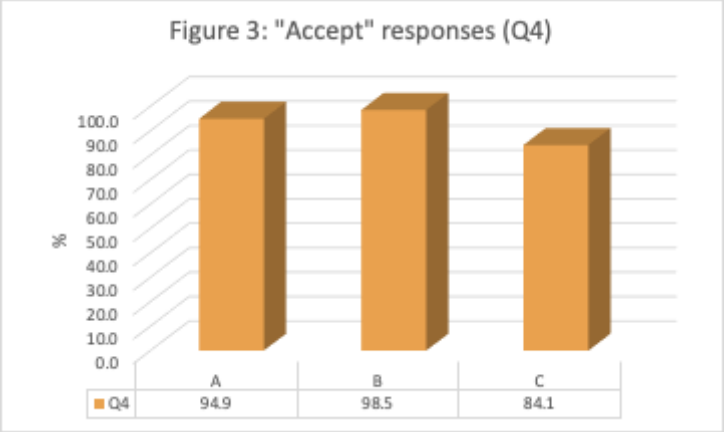
Figure 2: The fractions of subjects selecting the risk-averse choice in Question 3



Question 4: Default

Question 4's outcomes underscore the influence of establishing a default response, and they can be appreciated in Figure 3. Participants engaging with version A were active decision-makers, as their questionnaire did not feature any preselected choices. Of these participants, 94.9% clicked "Accept" when queried about their willingness to respond to some additional personal questions. In version B, the option "Accept" was pre-marked as the default choice, leading to a 3.6 percentage point rise in the acceptance rate. Conversely, when "Reject" was set as the default choice, there was a noticeable 10.8 percentage point decrease in the acceptance rate.

Figure 3: The fractions of subjects selecting accept in Question 4



5.3. REGRESSION ANALYSIS

The previous section summarizes the treatment effects in our experiment using simple averages. However, it does not provide formal statistical tests of the differences. In addition, Section 5.1 reveals certain differences in the gender and age composition across the treatments. Therefore, this section analyzes formally the treatment effectts using regression analysis with and without control variables

OLS (Ordinary Least Squares) and logit are two statistical methods used for regression modeling, but they are applied in different contexts and have distinct assumptions and characteristics.

The OLS method is ideal for models where the predicted, dependent variable is continuous. It estimates the linear relationship between the independent variables and the dependent variable. The direct interpretation of the coefficients is the average change in the dependent variable for each unit change in the independent variable, holding others constant.

The logistic model, Logit, is a statistical method that models the log-odds of an event as a linear combination of one or more independent variables. It is used when the dependent variable is binary or categorical. It is especially useful when modeling the probability of belonging to one of two categories. It models the probability of belonging to a category rather than the direct relationship between variables. The relationship is not linear but rather logarithmic in terms of odds. Coefficients are interpreted in terms of odds ratios, indicating how a change in the independent variable affects the odds (probabilities) of belonging to a particular category.

In this instance, given that our dependent variables are binary, we will employ the logistic model. We employ Gretl (Gnu Regression, Econometrics, and Time-series Library), a software package for econometric analysis.

Table 3 presents the estimates from a series of regressions. Each row in the table corresponds to one of the independent variables, while each block or pair of columns pertains to one of the questions or dependent variables subjected to regression. Within each block, the left columns depict the regression without the control variables (odd models), and the right columns deliver the estimates of the models with control variables (even models). Each cell provides the estimated coefficient of the regressor in the corresponding row, its level of significance, and the standard deviations in parentheses below the estimated coefficient.

In addition, the bottom rows of the table provide for each model the p-value of the Chi-square test of the equality of the treatment effect of B and C, the adjusted R-squared, the Chi-square test for the whole model, and N, representing the number of observations. In all regression, treatment A or the loss treatment in the English version of the survey are the comparison group.

Table 3. Multinominal Logistic Regression

	Q1		Q2		Q3		Q4	
	I	II	III	IV	V	VI	VII	VIII
B	0.1335 (0.83674)	−0.2286 (0.8755)	0.6823 * (0.3705)	0.7582 * (0.3872)			1.2629 (1.1689)	0.5347 (1.2356)
C	−1.9313 *** (0.6570)	−2.0149 *** (0.6870)	−0.0700 (0.3626)	−0.1564 (0.3778)			−1.2590 * (0.6856)	−1.7578 ** (0.7715)
Gains					1.8000 *** (0.3322)	1.6975 *** (0.3396)		
Basque		−0.6470 (0.8582)		−0.0052 (0.4311)		−0.8577 * (0.4614)		0.4273 (0.8581)
Spanish		−0.4407 (0.9001)		−0.2028 (0.4955)		−1.008 * (0.5436)		2.0207 ** (1.0043)
Age		−0.0361* (0.0195)		0.0201 * (0.0112)		−0.0091 (0.0118)		−0.0610 ** (0.0250)
Gender		−0.1908 (0.5256)		0.5988 * (0.3461)		−0.4036 (0.3877)		0.6137 (0.6495)
Const	2.9267 *** (0.5926)	5.1106 *** (1.3359)	0.10178 (0.2607)	−0.8928 (0.6123)	−1.2745 *** (0.22184)	0.08145 (0.6335)	2.9267 *** (0.5926)	4.6028 *** (1.4996)
Chi^2 Test: B=C (P-value)	0.0016***	0.0080***	0.0390**	0.0163**			0.0179**	0.0353**
Adjusted R squared test	0.0877	0.0718	-0.0029	-0.0107	0.1118	0.1049	0.0457	0.0708
Chi^2 test: Model (P-value)	0.0001	0.0005	0.0721	0.0812	0.0000	0.0000	0.0051	0.0018
N	189	189	189	189	189	189	189	189

Note: *** corresponds with a 1% significance level, ** corresponds with a 5% significance level and * corresponds with a 10% significance level. The numbers between brackets are Standard Deviations.

The estimates provided in Table 3 reveal to what extent the treatment assigned to each participant (responding to versions A, B, or C) is a predictor of the number of positive responses received. Examining model (I) in Table 3 illustrates that when participants respond to version B, the log odds of answering "yes" increase by 0.1335, whereas responding to version C results in a 1.9313 decrease in the log odds of answering "yes." Converting the regression coefficients using the antilog, exp(0.1335)=1.1428 and exp(-1.9313)=0.14496, yields the unadjusted odds ratio. Consequently, responding to version B increases the odds of answering "yes" by

14.28%, while responding to version C decreases the odds by 85.51%. The effect of treatment C is statistically significant, however, the effect of treatment B is not. Therefore, we cannot conclude that decomposing the yes option to different reasons for giving blood has a significant effect on choosing to donate.

Model (II) of table 3 shows the estimates with the control variables. Overall, although the estimates of the treatment effects vary slightly, the significance of these estimates is unaffected and the effect of the control variables is not significant for Q1. If we take a look at the difference between the effects of B vs. C in the Chi-square test row below the estimates, we observe that the effect of treatments B and C differ both in models I and II. Therefore, we can conclude that even though the effect of B is not significant, it is clear that B and C drive the choices in opposite directions.

The adjusted R-squared assesses whether additional input variables contribute to the model. In this context, the adjusted R-squared values for models (I) and (II) are 0.0877 and 0.0718, respectively. Although both figures are relatively low, model (II) has an even lower value, suggesting that the control variables do not effectively explain the dependent variable (number of "yes" responses for Q1).

The Chi-square test for the models evaluates their significance against the empty model, assuming all variable estimates are zero. Both p-values for models (I) and (II) are below 0.05, indicating statistical significance. Therefore, we can infer that both models explain something relevant.

Examining models (III) and (IV) corresponding to Q2 in Table 3, conclusions are similar to those for Q1. The estimate for treatment B is significant at 10%, while treatment C does not affect the choices significantly. However, the chi-square test for B and C indicates an opposite and statistically significant effect between treatments B and C.

Models (III) and (IV) differ from the others in terms of adjusted R-squared and chi-square test results. The negative R-squared suggests the model may be too complex for the sample size, or the independent variables have limited predictive value. The higher chi-square value implies the test is not statistically significant. However, since such a bad model performance is unique to these two models, we still assert that, overall, nudge theory predicts the numbers more effectively than traditional economic theory.

For Q3, participants underwent a slightly different treatment classification. Instead of versions A, B, or C, participants were categorized based on whether they received the framing question formulated as gains (lives saved) or losses (lives lost). Regressions (V) in Table 3, indicate that the odds of being risk-averse and choosing the sure thing are over 500% higher, as exp(1.800)=6.04965 and the estimate is highly significant. When we introduce controls in model (V), the effect decreases slightly but remains highly significant. Hence, framing is a strong deliver of individual choices.

Finally, when looking at models (VII) and (VIII), corresponding to the estimates for Q4, we can draw the same conclusion as for Q1 and Q2. Although only one treatment variation changes the replies significantly compared to the control group, both

treatments are statistically different, driving the choices of subjects to opposite directions.

The primary goal of introducing the control variables (even models) - age, gender, and language - is to assess whether they have an impact on the coefficients for our main variables. Upon introducing these controls, we observe that, although the coefficients are quantitatively affected and one changes sign, they are unaffected in terms of significance. Nevertheless, a couple of these variables exhibit significance at a 5% level for model (VIII). Responding to the Spanish version of the survey increases the odds of answering "yes" by 655%. Regarding the age variable, a one-unit change in age (1 year) is linked to a 0.6137 decrease in the log odds of a "yes" answer occurring. This suggests that the odds of responding yes decrease by 45.86% as age increases by a year.

Summarizing the results, Table 3 reveals that with one exception the predictions of the nudge theory are confirmed in our experiment. In contrast, we observe little support for the predictions based on the traditional economic theory. Therefore, we corroborate the literature in that nudges may constitute an effective and cheap policy instrument in real-life scenarios.

6. CONCLUSIONS

As evident in both real-world examples discussed in Section 2 and the outcomes of the survey experiment, people tend to deviate from rational thinking, contradicting classical theories but mostly confirming the predictions of the nudge theory proposed by Thaler and Sunstein. Nudges show the potential to bring about slight changes in behavior in specific situations. By comprehending how individuals make decisions, policymakers can formulate strategies to promote positive behaviors and discourage harmful ones.

However, it's crucial to consider the context of the survey experiment. Ecological validity, measuring how well an experiment replicates a real-world environment, is pertinent. In our case, utilizing a survey experiment is valid for exploring causal mechanisms among participants, but it lacks real-world consequences, as participants knew their responses wouldn't impact other aspects of their lives. DellaVigna and Linos (2022) noted that nudges from nudge units or policymakers might be less effective than interventions strictly designed as part of academic research.

Despite the importance of nudges in various experiments, skepticism persists about their true effectiveness, partly due to publication bias. Many null or negative studies remain unpublished, as scientific journals tend to favor those showing positive effects. Merterns et al. (2021) identified a moderate publication bias toward reporting the positive effects of choice architecture interventions on behavior.

Proving that nudges are the sole reason for behavior shifts is challenging. Human behavior can be influenced by numerous factors beyond nudges. Aside from measurable variables, respondents may answer survey questions differently based on

personal circumstances, mood, or the time of day. This complexity makes empirically proving the effectiveness of nudges challenging.

Despite these challenges, well-designed interventions and strategies hold the potential to influence behavior positively. Governments should focus on understanding citizens' needs and decision-making processes, establishing nudge units to craft policies that genuinely promote positive shifts in behavior.

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8. APPENDIX

Table A1. Descriptive statistics for all of the variables

Variable name	Mean	SD	Range	Description
Dependent variables				
Q1	0.87831	0.3278	0 to 1	1= Yes, 0= No
Q2	0.57672	0.4954	0 to 1	1= Yes, 0= No
Q3	0.37037	0.4842	0 to 1	1= Risk averse, 0= Risk taker
Q4	0.92593	0.2626	0 to 1	1= Accept, 0= Reject
Q 4.1	0.45714	0.4996	0 to 1	1= Yes, 0= No
Q 4.2	0.04000	0.1965	0 to 1	1= Yes, 0= No
Independent variables				
Age	37.085	16.191	17 to 69	Age in years
Female	0.57143	0.4962	0 to 1	1=Female, 0=Male
Language				
English	0.18519	0.3895	0 to 1	1= English, 0= Else
Basque	0.40741	0.4927	0 to 1	1= Basque, 0= Else
Spanish	0.40741	0.4927	0 to 1	1= Spanish, 0= Else
Version				
A	0.31217	0.4646	0 to 1	1= A, 0= Else
B	0.35450	0.4796	0 to 1	1= B, 0= Else
C	0.33333	0.4727	0 to 1	1= C, 0= Else
Gains	0.37037	0.4842	0 to 1	1= Gains, 0= Losses