

**Can insights from dual-process theory encourage environmentally
conscious purchasing behaviour?**

An experimental analysis

Andreea Beznea (456118)

Erasmus School of Economics, Erasmus University Rotterdam

Supervisor: Dr. Đ. G. Granić

Second Assessor: Dr. J. P. M. Heufer

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Abstract: This paper investigates a possible influence of System 1 vs. System 2 thinking, as defined by dual-process theory, on the willingness-to-pay (WTP) for environmentally conscious consumer products. 237 individuals participated in an online survey that asked respondents to provide the maximum amount they would be willing to pay for an FSC-certified notebook. Participants were split into two treatment groups that were primed with either an emotionally-laden mind-set or an analytical mind-set. In addition, data was collected on various drivers of WTP. The Becker-DeGroot-Marshak method was used to incentivise respondents to provide truthful answers, and nine participants were randomly selected to win the notebook or a cash prize depending on their 'stated preferences'. Results show that priming System 1 vs. System 2 did not produce statistically significant differences in WTP. However, due to several limitations, it is difficult to draw definite conclusions. The relationship between DPT and ethical consumerism should be further investigated.

Key words: Dual-process theory, System 1, System 2, affect heuristic, emotions, ethical consumption, green consumerism, FSC label, willingness-to-pay, environment, climate change, determinants of willingness-to-pay, Becker-DeGroot-Marshak method

Section 1 – Introduction

Dual-process theory (DPT) explains how the human mind runs on two parallel tracks: one that is fast, intuitive and rule-based, and one that is slow, reflective and analytical (Bargh, Chen and Burrows, 1996; Kahneman, 2012; Thaler and Sunstein, 2009). The first type of mental processing is sometimes referred to as ‘System 1’ and the second as ‘System 2’ (Stanovich and West, 2000). The existence of two distinct types of reasoning was first highlighted by Freud over 100 years ago (Ramsøy, 2015), but, over the last decades, researchers have become more and more interested in analysing this duality. DPT helps explain a number of behavioural biases and judgment errors, but also the ability to make quick decisions and to efficiently use the mind’s limited cognitive abilities. Consequently, the introduction of dual-process models of behaviour has weakened the image of the rational economic actor (Bargh and Huang, 2009). In line with this claim, experiments have demonstrated that external, subtle cues influence the accessibility of certain information in the brain and that presenting subjects with a stimulus in a controlled environment can affect the subject’s perception of a second, target stimulus. Such ‘priming’ experiments can be used to trigger either System 1 or System 2 thinking, and thus, to measure each system’s effects on decision-making and on the formulation of judgments. In this study, the influence of System 1 and System 2 priming will be explored in the context of environmentally friendly consumer goods.

According to the World Bank (2015), “Responding to climate change is one of the defining challenges of our time. [...] Addressing climate change requires individuals and societies not only to overcome complex economic, political, technological, and social challenges but also to get around a number of cognitive illusions and biases”. In 2015, the United Nations highlighted the importance of addressing climate change through the foundation of the Sustainable Development Agenda, setting goals aimed at tackling environmental deterioration, either directly or indirectly. Moreover, nearly 200 countries have adopted the Paris Agreement, promising to keep global temperature rise below 2 degrees Celsius this century (United Nations, n.d.). Although governments, international agencies and businesses have recognised the need to take pro-environmental actions, more can be done to drive behavioural change at the individual or consumer level (Alexander, 2013; World Bank, 2015). One way to do this is to encourage ‘green consumerism’ (Guagnano, 2001) or the purchase of eco-friendly consumer products. Various studies have tried to understand how individuals perceive climate change and environmental deterioration, and how ethical consumption can therefore be ‘nudged’ (e.g., Brügger, Morton and Dessai, 2016; Krystallis and Chrysohoidis, 2005; Liebe, Presendorfer and Meyerhoff, 2011). However, there is limited research on how DPT can play a role in improving pro-environmental action.

The present research thus investigates the question: does priming System 1 versus System 2 change how much people value environmentally friendly products? It is expected that the emotionally-driven System 1 should induce a higher willingness-to-pay (WTP) than the more calculated System 2. The direction of this hypothesis is further explained in the subsequent section. To collect data on this research topic, an online survey was presented to 315 individuals. The total sample size resulted in 237 data points, with a relatively equal split between the System 1 and System 2 treatment groups. Respondents were shown an FSC-labelled notebook and were directly asked to state their WTP for the notebook, given a specific price range. Moreover, the Becker-DeGroot-Marshak method was used to limit the hypothetical bias that exists in traditional Contingent Valuation Method (CVM) studies on environmental goods and to incentivise respondents to provide truthful answers. Participants could therefore ‘win’ the notebook or a cash prize depending on the answers provided.

To gain an even deeper understanding of the factors that could potentially drive a difference in WTP between the two processing systems, respondents were also asked several questions on possible determinants of WTP, some expected to be accentuated by System 1 and some by System 2.

Results showed that participants primed with a System 1 mind-set did not produce statistically different WTP values compared to participants primed with a System 2 mind-set. Similarly, the determinants of WTP were not influenced by priming. Nevertheless, certain determinants impacted WTP in either a positive or negative way; one of the most significant effects being that of personal experience. It was found that the more people felt affected by climate change and environmental deterioration, the less they were willing to pay for the eco-friendly notebook. This could be because purchasing behaviour may be considered ‘ineffective’ in the context of addressing climate change. Further research should dig deeper into the driving forces of ethical consumerism or environmentally conscious behaviour, in general.

Section 2 – Theoretical framework

2.1 Dual-process theory and the role of emotions

DPT highlights two different modes of processing information (Epstein, 1994; Evans, 2003; Evans, 2008; Kahneman, 2003; Kahneman and Frederick, 2002; De Neys, 2006; Stanovich and West, 2000; Thaler and Sunstein, 2009). These modes, sometimes referred to as System 1 and System 2¹, represent distinct

¹ Thaler and Sunstein (2009) refer to these systems as the ‘Automatic System’ and the ‘Reflective System’. However, for simplicity and clarity, the generic labels ‘System 1’ and ‘System 2’ will be used throughout this paper (Stanovich and West, 2000). For an overview of the labels attached to dual processes in literature, see Table 1 in Evans (2008).

cognitive processes that can be illustrated in various ways². However, most authors agree on a distinction between unconscious, rapid and automatic processes, and conscious slow and deliberative processes (Evans, 2008). The first type of information processing system (i.e., System 1) can be described as a person's 'gut feeling'. This system drives intuitive thoughts and actions requiring no cognitive effort. An example of System 1's intuitive reactions is the feeling of nervousness when a plane hits turbulence. The operations of the intuitive system are therefore emotionally loaded and governed by habit, making them difficult to control (Kahneman, 2003). Meanwhile, the second type of information processing system (i.e., System 2) is responsible for analytical thoughts and controlled actions requiring cognitive effort and flexibility. This system intervenes when an individual undertakes an intellectually straining task, or when it is necessary to correct System 1's judgment errors (Evans, 2003; Goel and Dolan, 2003). Although System 2 articulates judgments and makes deliberate choices, it often endorses ideas and feelings that are generated by System 1. This is in part because the analytical system's abilities are limited and the knowledge base that it has access to is equally limited (Evans, 2003; Kahneman and Frederick, 2002; Kahneman, 2003; De Neys, 2006). In the context of the present research, the distinction between judgments made by System 1 and those made by System 2 is important. 'Judgment' can therefore be measured by the value assigned to an object, which can be driven by emotional and intuitive forces, or by analytical and calculated ones.

Even though these systems have distinct attributes, they work in parallel when guiding human behaviour. This relationship is best described as two operating systems, sharing the same hardware and data (Evans, 2003; Morewedge and Kahneman, 2010). As stated by Kahneman and Frederick (2002, pp. 51-52), "We assume that System 1 and System 2 can be active concurrently, that automatic and controlled cognitive operations compete for the control of overt responses". In other words, our mind runs on two tracks, one that is fast and intuitive and one that is slow and reflective. The second of the two is never 'off', but it is ready to intervene when difficult decisions need to be made or when something novel needs to be evaluated (Ramsøy, 2015; Slovic, Finucane, Peters and MacGregor, 2002). The benefit of unconscious and automatic processes is that they relieve System 2 from tedious and repetitive things, since conscious and analytical processes require more brain activation and more energy. According to Ramsøy (2015, p. 99), "The body has an energy budget [...] the brain takes up only around 2% of the body's overall weight but is known to consume around 20% of the body's energy". Therefore, the dual-process model explains the way our mind attempts to efficiently use this limited energy resource (Finucane and Holup, 2006).

² Table 2 in Evans (2008) provides an extensive overview of the different attributes associated with the two systems of thinking, clustered into attributes associated with consciousness, evolution, functional characteristics and individual differences.

Individuals' automatic state of mind can be awakened by emotions because an important dimension of System 1 is its affective basis. More explicitly, it relies on images and associations that are connected to emotion and affect³ through experience (Slovic, Peters, Finucane and MacGregor, 2004). Epstein (1994) argues that there is a contrast between the 'experiential' and 'rational' systems⁴, and that emotions are triggered by automatic, preconscious and rapid construals that sometimes hinder the intervention of more deliberate, sequential and analytical ones: emotions evoke automatic and unconscious responses, but emotions themselves are generated by unconscious triggers. In line with this claim, some researchers have emphasised the role of affect in guiding judgments and decisions, known as the 'affect-as-information theory' or 'affect heuristic' (Haidt, 2001; Loewenstein, Weber, Hsee and Welch, 2001; Slovic, Peters, Finucane and MacGregor, 2005; van Gelder, De Vries, Van der Pligt, 2009). This theory explains that people often rely on their moods and momentary flashes of feeling when making judgments and decisions (Damasio and Sutherland, 1994). In fact, one way emotions are understood is through their adaptive coordination role, enabling individuals to address already encountered problems or opportunities rapidly (Lerner, Li, Valdesolo and Kassam, 2015). Consequently, emotions save cognitive processing capacity by triggering "time-tested responses to universal experiences (such as loss, injustice and threat)" (Lerner et al., 2015, p. 805). Emotions are thus encoded with motivational attributes: when activated feelings are pleasant, they motivate actions and thoughts expected to reproduce these feelings, and vice versa when feelings are unpleasant. The affective system and the analytic system therefore work in parallel to ensure human survival and regulation. The role of emotions is important when understanding the way people react to risks; a distinction between risk-as-analysis and risk-as-feeling is further explained in subsections 2.2 and 2.4. This is relevant for the present study, since climate change is defined as a global threat which exposes all individuals to environmental risks (The World Bank, 2015).

The affect heuristic can lead to optimal outcomes but can also bring on unwanted consequences. This depends on how well experience allows us to anticipate the outcome of our decisions or how much short-term gains are pursued at the expense of more important, longer term gains (Finucane and Holup, 2006; Slovic et al., 2002). Since many objects in our surroundings can trigger either System 1 or System 2 processing, choices and judgments are in part manipulated by *subliminal* cues. Consequently, both systems can be evoked by language, images or associations. Manipulating the way in which we communicate

³ Slovic et al. (2002; 2004) define 'affect' as a quality of 'goodness' or 'badness' experienced as a feeling state. It represents either a positive or negative quality of stimulus.

⁴ Epstein (1994) explains the mind's duality through the 'experiential' and 'rational' system, which are comparable to what has so far been described as System 1 and System 2, respectively. This version of DPT places greater emphasis on experience and affect. As is described in other dual-process accounts of reasoning (e.g., Evans 2003), the experiential system is old in evolutionary terms and shared with other animals, while the rational system has a brief evolutionary history and is distinctly human.

something can influence the way our mind assigns weight to certain elements of the information that is provided. Implicitly, both analytical and affective considerations can influence risk perception and risky choice, and it is possible to determine the strength of analysis or affect as predictors of risky choice (van Gelder et al., 2009). Based on the aforementioned research, it is possible to assume that invoking emotional thoughts or ideas through priming may induce more intuitive reactions, which will affect judgments, decisions and risk-taking behaviour. Similarly, priming analytical thoughts or ideas may lead to more calculated judgments, decisions and risk-taking behaviour. The next subsection will focus on such priming effects.

2.2 Affective and analytical priming

Priming refers to the influence of external, subtle cues on the accessibility of certain information in the brain. Incidental primes in a person's environment are able to trigger associations or mental representations that can stimulate action (Bargh, Chen and Burrows, 1996; Bargh, Green and Fitzsimons, 2008; Kahneman, 2012; Thaler and Sunstein, 2009). The growing realisation that external situational variables are sometimes more important than values and personality in determining behaviour and the introduction of dual-process models of behaviour have played an important role in diluting the image of the traditional rational economic actor (Bargh and Huang, 2009). Experiments on priming have therefore attempted to examine the incidental priming hypothesis in a controlled environment, by presenting subjects with one stimulus and measuring its influence on the subjects' perception of a second target stimulus.

Thaler and Sunstein (2009) provide examples of priming experiments, which illustrate the 'mere-measurement effect'. That is, when people are asked about their intentions (e.g., about voting), they are more likely to act in accordance with their answers (e.g., go vote). Furthermore, research shows that the presence of stereotyped groups (e.g., elderly) can lead to the activation of semantically affiliated behavioural traits and subsequent behaviour in line with these traits (e.g., moving slowly). Aarts and Dijksterhuis (2003) explain this as the "overlap between perceptual and behavioural representations for the same type of behaviour" (p. 19). The elicitation of stereotypical information about a social group activates mental representations about the respective social group and behavioural traits associated with this group. The mere perception of these behavioural traits can tune a person's behaviour accordingly, without a consciously expressed intent to do so. Dijksterhuis and van Knippenberg (1998) argue that the ability to mirror behavioural patterns by using abstract concepts such as traits and stereotypes has an evolutionary origin associated with the human instinct of survival. Moreover, human beings are social animals that are influenced by the behaviour of other humans, and this social link can induce action.

In line with these findings, research has shown that it is possible to prime either System 1 or System 2. For example, Dijksterhuis and van Knippenberg (1998) conducted a series of experiments illustrating the effect of priming on ability-related performance using the stereotypes of professors and football hooligans, as well as the traits ‘intelligent’ and ‘stupid’. The priming of stereotypes proved to be more significant than the priming of traits; however, both the activation of traits and stereotypes evoked similar behaviour. Participants primed with the stereotype of professors demonstrated a higher level of performance on general knowledge questions than participants primed with the alternate stereotype. Consequently, priming ‘intelligence’ in a direct or indirect way is likely to induce participants to concentrate more on a task, to adopt an analytical approach or to think systematically about possible solutions.

Similarly, Baghaei Lakeh and Ghaffar zadegan (2015) primed participants to use their reflective mode of thinking by asking analytical questions prior to an ability-related task. This influenced the performance of participants on the task in a positive way. It is also possible to reinforce this effect by warning people of the difficulty of the task, directly encouraging them to use their analytical mind-set or asking participants to justify their answers (Baghaei Lakeh and Ghaffar zadegan, 2016). The latter represent additional methods of activating System 2 thinking. However, they move further away from the traditional priming exercise, which aims to elicit perceptual representations of a given behaviour in an unconscious and indirect way. Nonetheless, research suggests that such interventions can improve performance on otherwise complex tasks through the activation of System 2, which enables people to exert more effort in answering ability-related questions or formulating judgments.

Other literature has emphasised the impact of affective priming on people’s judgments and decisions. In trying to find supporting evidence for the affective primacy hypothesis⁵, Murphy and Zajonc (1993) conducted experiments comparing the effect of cognitive and affective stimuli on liking rates and judgments of objective characteristics. When subliminally exposed to happy and angry faces, participants’ liking rates were higher for those that were exposed to happy faces than for those that were exposed to angry faces. Meanwhile, cognitive stimuli (i.e., geometrical shapes) interacted more with judgments of objective characteristics rather than liking rates. Such priming experiments suggest that affective primes have the most influence when a subject is asked about his or her subjective opinion on the likeability of an object, which in turn illustrates the use of the ‘affect heuristic’ (see subsection 2.1). Therefore, System 1 priming leads to the use of past experience and emotions to evaluate an object based on subjective criteria, whereas System 2 priming leads to the use of more analytical and objective criteria of evaluation. Furthermore, in

⁵ The affective primacy hypothesis states that positive and negative affective (System 1) reactions can be elicited with minimal stimulus input and no cognitive processing. These affective reactions can be sustained or mitigated by further cognitive operations (Zajonc, 1980; Murphy and Zajonc, 1993).

Murphy and Zajonc's (1993) experiments, the observed System 1 and System 2 reactions were identified under subliminal and supraliminal conditions, respectively, implying that affective evaluations occur rapidly and without awareness, whereas cognitive evaluations require conscious processing.

The aim of the present study is to compare valuations of an eco-friendly consumer good when individuals are primed with either their System 1 or System 2 cognition. This entails comparing people's valuations when they use a more subjective and emotionally laden approach and when they use a more objective and 'cold state' approach. Priming tends to have a lasting effect on subjects and should therefore carry forward to the moment that the subject needs to elicit a value for the good (Dijksterhuis and van Knippenberg, 1998). A distinction should also be made between incidental and integral emotions. According to Lerner et al. (2015), the latter serves as a beneficial guide (e.g., anxiety can lead to safer choices), while the former occurs without awareness and carries over from one situation to the next (e.g., a bad mood can lead to pessimistic judgments). Both types of emotions are triggered in the context of this study (for both System 1 and System 2 processes) and are expected to impact the subject's WTP. The methodology behind this two-stage priming approach is further explained in Section 3.

Before considering the channels that induce differences in WTP, there is evidence to suggest that positive priming (e.g., happy face) leads to a higher WTP for consumer goods than negative priming (e.g., angry face) (Winkielman, Berridge and Wilbarger, 2005). This can be explained by the fact that when people are in a good mood they tend to evaluate targets more positively than people in a bad mood (Murphy and Zajonc, 1993). Furthermore, positive emotions have been found to trigger System 1 thinking more than negative emotions since the latter may prompt defensive reactions (Lerner et al., 2015). Alternatively, certain stereotypes (e.g., professors) can evoke mental representations of intelligence and analysis and have been found to encourage a more analytical mind-set (Dijksterhuis and van Knippenberg, 1998). These priming effects are used in this study to incidentally invoke either System 1 or System 2 processing, prior to using integral emotions to further elicit either an emotionally laden or a calculated perception of risk (known as 'risk-as-feeling' and 'risk-as-analysis'). In this paper, risk-taking behaviour is associated with a reduced willingness to respond to a risk and therefore a lower WTP. Integral emotions are obtained through the use of specific language that calls on either System 1 or System 2 reasoning (van Gelder et al., 2009). More specifically, the use of fear is used to trigger a System 1 response and the use of numbers is used to trigger a System 2 response. Fear is used as a negative emotion to induce action, as it is expected to generate instinctive and quick reactions that are associated with System 1 processes (Lerner et al., 2015). Consequently, this two-step priming approach is expected to have an impact on respondents' WTP in the following way:

Hypothesis 1: Participants primed with a System 1 mind-set will have a higher WTP than participants primed with a System 2 mind-set.

Hypothesis 1 constitutes the main focus of the study and aims to gather insights into whether System 1 or System 2 can have an influence on the WTP for environmentally conscious products. Meanwhile, the following subsections explore several factors that might lead to a difference in the WTP of individuals primed with an affective mind-set and those primed with an analytical mind-set.

2.3 Determinants of willingness-to-pay

Although the focus of this paper is on private environmental goods (i.e., consumption goods that have a public benefit), it is important to first consider what determines WTP for public environmental goods.

Environmental goods are classified as ‘public goods’ since they serve a collective interest and are not traded in the market. For this reason, they are sometimes referred to as ‘non-market goods’, identified by their ‘non-excludability’ and ‘non-rivalry’ in consumption. This means that no one can be excluded from using the good once it is provided and one person’s consumption of the good will not decrease the benefits of another person’s consumption of the good (Deneulin and Townsend, 2007; Liebe et al., 2011). Given their nature, public goods are open to free-riding and vulnerable to failures of collective action or social dilemmas. According to Kollock (1998, p.183), “Social dilemmas are situations in which individual rationality leads to collective irrationality”. In other words, a rational actor would not perceive the benefit of contributing to a public good, but if everyone contributed to it everyone would be better off. Nonetheless, economic experiments have shown that people sometimes cooperate in public good games and that they do not always free-ride on the contribution of other players. This can be explained by various theoretical approaches focused on fairness, inequity aversion and reciprocity (Liebe et al., 2011).

If the value of public environmental goods (e.g., clear air, unpolluted water or biodiversity) cannot be extracted from people’s revealed preferences in the context of markets, they are often determined by people’s stated preferences in the context of surveys (Liebe et al., 2011). This method of deriving the monetary value of nature is called the Contingent Valuation Method (CVM) and requires participants to attach an economic value to environmental goods or services by directly stating the maximum amount they would be willing to pay for the respective good or service (Carson, Flores and Meade, 2001; Carson and Hanemann, 2005; Krantzberg and De Boer, 2006). However, Kahneman and Knetsch (1992) suggest that WTP estimates are not always a valid indication of the price that people would realistically pay for the public good in question and are more likely to represent an individual’s willingness to acquire moral satisfaction (or the ‘warm glow’ of giving).

The sense of moral satisfaction that individuals derive from contributing to public goods can be attributed to theories of altruistic or moral behaviour, which are based on a wider motivational structure than standard economic models of valuation. Altruism can be defined as a gain in utility from having other people better off (Liebe et al., 2011). Schwartz' (1977) norm-activation model explains that altruistic behaviour arises when individuals are conscious of the negative consequences of social conditions or environmental degradation, and attribute responsibility for acting in the collective interest to themselves. As such, altruistic motivation can lead to a perceived moral obligation to financially contribute to environmental goods, from which individuals can derive personal satisfaction. This subjective obligation to support good causes, as well as the general 'warm glow' of giving, are determinants of WTP for environmental goods. Furthermore, in the context of Schwartz' model, people's awareness of the need to take collective action and their awareness of personal responsibility will determine their willingness to contribute to the provision of environmental goods (Guagnano, 2001; Schwartz, 1977).

The WTP drivers stated above differ from those found in traditional economic models, which state that income and the use of the good under consideration are the most important influencers of WTP estimates (Carson et al., 2001). It is important to note that the total value of public environmental goods is composed of both use and non-use values, making them a unique kind of public good. Tietenberg (2006) explains that the total value of an environmental good can be described as the value derived from the direct use of the environmental resource, the option to use the resource in the future or simply the willingness to preserve the resource in question. It is therefore expected that users of public goods are likely to have a higher valuation than non-users. However, all participants in this study are assumed to be 'users' of the environmental good in question, since the subject of the study is 'climate change'.

In a study that incorporates competing theories of WTP drivers, Liebe et al. (2011) find three significant determinants of WTP for forest conservation: income, fear and awareness of responsibility⁶. Based on these findings, it is possible to expect that individuals' income level, general attitude towards the environment and personal sense of responsibility will positively influence the amount of money they are willing to contribute to the provision of environmental goods. Other studies have highlighted the importance of emotions such as fear or scepticism, as well as the perception of risk associated to climate change, to have an impact on people's willingness to act (Brügger et al., 2016). It is thus more likely for individuals to try

⁶ For an overview of the WTP drivers and the corresponding theoretical foundations included in the analysis, see Table 1 in Liebe et al. (2011). The three determinants of WTP that were found to have the most significant impact belong to three different theoretical approaches: the standard economic framework, the attitude-behaviour paradigm and Schwartz' norm-activation model.

to prevent further environmental damage when they have had personal experience with the dangers of climate-related risks (Weber, 2010). Additionally, as mentioned in subsection 2.1, both affective and analytical considerations linked to risk perception can affect the way people process risky situations (van Gelder et al., 2009).

The determinants of WTP that apply to public environmental goods may also apply to private environmental goods since their consumption has a collective benefit (e.g., products made from recycled material). In this case, consumers have the option to contribute to the collective good by making pro-environmental purchasing choices. Such goods have a market value, and the total value of the product contains a premium that represents the collective value of the good. Consequently, the costs associated with purchasing private environmental goods are personal, while the benefits are collective; and individual decisions about these goods will incorporate an element of concern for the public welfare. It is therefore expected that this 'premium' will be influenced by the same factors that determine the WTP for public environmental goods. Guagnano (2001) refers to this phenomenon as 'green consumerism' and states that market and market-like behaviour can also be motivated by altruism. Other studies (Annunziata, Ianuario and Pascale, 2011; Laroche, Bergeron, Barbaro-Forleo, 2001) define 'ethical consumption' as a growing phenomenon that stems from an increase in consumer awareness of issues associated with trade and ethical consumption. Therefore, determinants of WTP for ethical products may depend on intrinsically motivated factors and consumers' attitudes towards the product (Laroche et al., 2001). Furthermore, for an ethical consumer, *labelling* transforms the 'credence characteristics' of ethical products into search attributes, allowing consumers to better evaluate their choices in terms of their preferences and values (Annunziata et al., 2011). Confidence in the brand or the labelling of products may therefore impact the amount individuals are willing to pay for the product (Angulo, Gil and Tamburo, 2005; Krystallis and Chrysohoidis, 2005).

The present study focuses on the WTP for private environmental goods and the impact of dual-process manipulation on the maximum amount that individuals are willing to pay for an environmentally conscious product. As mentioned above, private environmental goods include a premium representing the amount respondents are willing to pay on top of the price that they consider to be fair for a similar item. This amount represents what consumers are willing to contribute to the provision of a public benefit such as clean air. The altruistic nature of this premium makes it susceptible to influences of either calculated (cold) or emotional (hot) processing states. Additionally, since private environmental goods have a market value, the hypothetical CVM used to elicit the WTP for public environmental goods can be traded for a direct observation method of respondents' WTP (Krantzberg and De Boer, 2006). This has the potential to remove the hypothetical bias that is sometimes associated with the CVM (Diamond and Hausman, 1994;

Tietenberg, 2006). For the purpose of this study, a limited number of determinants of WTP are deemed relevant: personal experience with climate change risks, fear, altruistic values, scepticism about climate change, awareness of responsibility and trust in ethical labelling (Angulo et al., 2005; Brügger et al., 2016; Guagnano, 2001; Krystallis and Chrysohoidis, 2005; Liebe et al., 2011; Weber, 2010).

It is expected that the selected WTP drivers will be disproportionately affected by either affective or analytical priming. The relationship between priming and WTP is further elaborated in subsection 2.4.

2.4 Effects of affective and analytical priming on willingness-to-pay

The scope of the research is twofold: to uncover whether priming induces a difference in the WTP for ethical products (Hypothesis 1) and to investigate the channels through which this phenomenon occurs. In other words, the various WTP drivers of private environmental consumer goods are likely to play a more or less significant role in determining the subject's total stated WTP, depending on the mental processing state that is induced through priming. It is expected that System 1 priming will enhance the impact of certain drivers of WTP, and that System 2 priming will enhance the impact of different drivers of WTP on the respondents' stated WTP. Since ethical products have a 'public good' component, the stated value of such products is determined by people's beliefs about climate change, their sense of responsibility and their trust in ethical labelling, amongst other factors. Research shows that certain drivers, in comparison to others, are likely to be accentuated by affective considerations, while others by analytical ones.

Weber (2010) explains that learning from personal experience requires more associative and often affective mental processes, while learning from statistical descriptions involves more analytical and cognitively straining processes. As such, personally experiencing the consequences or risks of climate change can have a greater influence on people's willingness to act through the activation of information stored in memory (Evans, 2008). For example, triggering System 1 thinking may make extreme weather events more easily retrievable in a person's memory and may promote a higher WTP for environmental goods. Experiencing the consequences of climate change is likely to prompt emotions of fear and worry, which are also triggered through priming. As mentioned in subsection 2.1, emotions generate automatic, affective responses to stimuli, but they are themselves prompted by the mind's intuitive reactions to risky situations (Epstein, 1994; van Gelder et al., 2009). Risk-as-feeling, as opposed to risk-as-analysis, tends to overweight frightening consequences and their likelihood (Slovic et al., 2004). More specifically, fear has been proven to stimulate System 1 responses and to induce a higher perception of risk in comparison to other negative emotions (Lerner et al., 2015). Additionally, fear induces worry and feelings of uncertainty, and a tendency

to want to reduce this uncertainty through a higher willingness to take action. Such concerns may apply to individuals themselves or to the wider population. Mainstream economics argues that a rational actor would never contribute to the provision of a public good, but theoretical evidence suggests that people may care about public goods due to fairness, inequity aversion and reciprocity (Liebe et al., 2011). It is therefore possible that the WTP for a private environmental good is, to some extent, driven by altruistic motivation. Altruism, or the gain in utility from having others better off, is determined by beliefs rather than rational calculations (Guagnano, 2001) and should thus be enhanced by affective priming. Moreover, affect plays an important role in altering decisions based on more equitable considerations (Schulz, Fischbacher, Thoni and Utikal, 2014). Based on these assumptions, it is possible to formulate the following hypothesis:

Hypothesis 2: The effect of ‘personal experience’, ‘fear’ and ‘altruism’, in comparison to the effect of ‘scepticism’, ‘awareness of responsibility’ and ‘trust’, will be stronger in the System 1 priming scenario.

According to Brügger et al. (2016), when climate change is perceived as a distant threat, people rely more on scepticism to process risks and to make decisions about supporting environmental causes. If people discount climate change because they perceive it as a minimal risk, they will be inclined to use scepticism to make judgments about the value of environmental goods. Since scepticism is linked to abstract reasoning, it is possible that System 2 priming will enhance the level of scepticism that respondents will use to assess the value of an environmental good, leading to a lower WTP (Brügger et al., 2016; Evans, 2008). Moreover, since standard economic theory assumes that a rational actor would not contribute to the provision of a public good and would depend on the contribution of others, it is reasonable to expect that an individual primed with an analytical mind-set would be inclined to feel less responsible for the provision of an environmental good than a person primed with an affective mind-set. Alternatively, people might assume that their contribution will be ineffective and that they are not liable to respond to environmental deterioration (Udén, 1993). System 2 priming can accentuate this individualistic or ‘realistic’ way of reasoning in comparison to System 1 priming, thereby impacting WTP in a negative way. The Schwartz (1977) model states that ‘personal responsibility’ is necessary for altruistic behaviour to occur. This implies that altruistic action is less likely in the absence of such a belief. Furthermore, WTP can be expected to decrease when respondents distrust informative labelling such as the one that is used in this study. The labelling of ethical products is considered an important information tool for consumers and is used as an attribute of comparison between different products (Annunziata et al., 2011). For individuals primed with an analytical mind-set, the label might not provide sufficient information on the benefits or credibility of the product. The following hypothesis can thus be drawn on the basis of the aforementioned expectations:

Hypothesis 3: The effect of ‘scepticism’, ‘awareness of responsibility’ and ‘trust’, in comparison to the effect of ‘personal experience’, ‘fear’ and ‘altruism’, will be stronger in the System 2 priming scenario.

The following section will describe the experimental design used in this study.

Section 3 – Experimental design

3.1 Data collection and survey outline

As highlighted in the theoretical framework, the focus of the study is on the impact of either System 1 or System 2 on WTP. A higher WTP for an environmentally friendly consumer product is therefore associated with a higher willingness to respond to climate change and environmental deterioration, since climate change is defined as a risk in the context of this study (van Gelder et al., 2009).

Data was collected using an online survey, designed using Qualtrics and made available in both a web and mobile version. Respondents were contacted through social media and were invited to connect to the survey using an anonymous link, safeguarding their privacy and anonymity. Moreover, the progress of participants was saved, so that they could return to the survey at a later moment. Meanwhile, the “Prevent Ballot Box Stuffing” setting ensured that participants could only complete the survey once.

The survey begins with a short introduction thanking readers for their participation (see Appendix A4 for a transcript of the survey). The readers are informed that they will be required to provide a monetary value for a notebook, and that nine respondents will have the opportunity to win the notebook or a cash prize, depending on the answers provided. No further information about the pricing mechanism is specified at this stage. An additional ‘charity incentive’ is introduced to encourage all participants to focus on the entirety of the survey (explained in more detail further down).

Respondents are randomly allocated between two treatment groups: one that is presented with exercises designed to trigger System 1 thinking and one that is presented with exercises designed to trigger System 2 thinking (explained in more detail further down). The goal is to assess whether participants in the first group provide higher WTP values than participants in the second group.

A direct scaling method is used for the WTP question. Respondents are asked to provide the maximum value they are willing to pay for a notebook, given the price range of €1.00 to €4.50. Oftentimes, WTP surveys on environmental goods rely on hypothetical valuations of products or services that are not traded on the market. In this survey, the object in question has a market value. However, being an ‘ethical’ product,

the value of the object contains a premium representing the value that people assign to environmental protection (Krystallis and Chryssohoidis, 2005). The object used in this study is a Silvine A5, ring notebook with a Forest Stewardship Council (FSC) mark on the cover. A photograph of the notebook is shown to the participants taking the survey, alongside a short description of the FSC label⁷.

Following the WTP question, respondents are presented with six questions referring to six different determinants of WTP. The six questions are randomised each time a respondent takes the survey to reduce order effects. To make the questions more relatable to participants, climate change is coupled with the wider issue of ‘environmental deterioration’. All six questions in this section are phrased in a similar way and focus on the following determinants of WTP: personal experience with climate change risks, fear, altruistic values, scepticism about climate change, awareness of responsibility and trust in ethical labelling (based on the research of Angulo et al., 2005; Brügger, Morton and Dessai, 2016; Guagnano, 2001; Krystallis and Chryssohoidis, 2005; Liebe et al., 2011; Weber, 2010). Respondents are asked to rate how much they agree or disagree with the questions on a five-point ordinal (Likert-type) scale, ranging from “not at all” to “a great deal”.

Participants are then presented with nine questions that serving control variables: seven demographic questions (gender, occupation, age, nationality, level of education, educational background, level of monthly expenditure) and two questions targeting the respondent’s knowledge of the FSC label and the respondent’s general attitude towards environmental wellbeing. An overview of the survey design is presented in Figure A3.1.

3.2 The two-stage priming approach in more detail

3.2.1 The first priming stage: the priming task

The first stage of priming consists of a traditional priming task that elicits a given behaviour or state of mind in an unconscious and indirect way. It aims to trigger ‘incidental’ emotions or mental representations occurring without awareness and carrying over from one situation to the next, unrelated situation (Lerner et al., 2015; Dijksterhuis and van Knippenberg, 1998). It is therefore expected that the two-stage priming design will reinforce the impact of priming on the valuation of the notebook since the emotions induced in the first stage should carry over to the second stage, and both effects should carry forward to the following questions.

⁷ The photograph of the Silvine notebook was retrieved from Office Express UK’s online shop (Office Express UK, 2018).

The System 1 prime aims to promote automatic, intuitive and emotionally-driven responses. The exercise that is used to trigger System 1 thinking in the first priming stage is inspired by Murphy and Zajonc's (1993) experiment, which demonstrated that exposing people to happy faces induced them to evaluate objects more positively and subjectively. In the present study, subjects that are assigned to the System 1 prime in the first stage must observe a photo of a group of friends smiling and provide three characteristics that they associate with the image⁸. In this way, respondents are forced to take some time to observe the image, which should contribute to making the effect of the prime last longer. Moreover, the positive nature of the photo is expected to trigger positive emotions that induce an 'automatic', as opposed to a 'defensive', state of mind (Lerner et al., 2015). This should therefore enhance the effect of the second priming task, since emotions themselves are activated by automatic, preconscious and rapid construals (Epstein, 1994).

The System 2 priming task asks respondents to imagine a professor and to write down three characteristics that they associate with a professor. Again, since respondents are asked to provide multiple characteristics, they are forced to spend some time retrieving the mental representation of a professor from their memory⁹. The presence of stereotyped groups such as professors have been found to unconsciously activate semantically connected behavioural traits and subsequent behaviour in line with these traits (Thaler and Sunstein, 2009). The stereotype of professors has been used in an experiment by Dijksterhuis and van Knippenberg (1998) to induce participants to concentrate more on a task and to adopt an analytical approach. Triggering System 2 thinking requires conscious processing, which should carry over to the second stage of priming, making respondents think more critically about the information that is presented in the priming text.

3.2.2 The second priming stage: the priming text

In the second priming stage, respondents are presented with different texts depending on the treatment group that they are assigned to. Respondents that were exposed to the System 1 prime in the first stage are presented with a text which emphasises emotions of fear, anxiety and worry. Respondents that were exposed to the System 2 prime are presented with a similar text, but one that focuses on numbers and scientific facts. Both texts are designed to raise awareness about the dangers of climate change, but in different ways. For example, the first text begins with "*People's anxiety regarding climate change has gone up in recent years*" and the second text begins with "*The number of people talking about climate change has increased in recent years*". In the first scenario, the text aims to invoke emotional reactions to risky situations, whereby

⁸ The image is an Istock/Gpointstudio photograph retrieved from an online article (Dreher, n.d.).

⁹ Respondents in the System 2 priming group are not presented with an image, because images can prompt System 1 cognition (Amit and Greene, 2012). Instead, respondents are asked to imagine a professor, and thus, to retrieve the image of a professor from their memory.

in the second scenario, the text aims to induce a critical assessment of risky situations. As was highlighted in Section 2, ‘risk-as-feeling’, as opposed to ‘risk-as-analysis’, tends to accentuate frightening consequences and their likelihood (Finucane and Halop, 2006; Slovic et al., 2004).

This method of priming ‘affective’ versus ‘analytical’ considerations when judging risky situations is a way to trigger ‘integral’ emotions through the use of specific language. The phrasing of the two texts was inspired by van Gelder et al.’s (2009) experiment, which demonstrated that manipulating ‘feelings’ versus ‘analysis’ leads to different ways of processing risky situations, and consequently, different levels of willingness-to- take-action to reduce the risk.

The information that was used to formulate the priming texts was retrieved from various media sources and academic articles: Brügger et al. (2016), The Ecolabel Index (2017), The Forest Stewardship Council (n.d.), Goldenberg (2014), NASA (2017), Scarborough, Appleby, Mizdrak, Briggs, Travis, Bradbury and Key (2014) and WeForest (n.d.). Furthermore, the two texts have a similar number of words (139 versus 144 in the System 1 versus System 2 texts, respectively), such that respondents in both treatment groups spend a similar amount of time reading the texts.

3.3 Incentives

3.3.1 Willingness-to-pay incentive

The Becker–DeGroot–Marschak (BDM) pricing mechanism is used to incentivise respondents to state their prices truthfully (Becker, DeGroot, Marschak, 1964). The BDM mechanism has been implemented in various ways. Traditionally, subjects submit an ‘offer price’ to purchase the good under consideration, after which a ‘sale price’ is randomly drawn from an interval that takes into account the maximum possible WTP amongst bidders. Bidders that submit a price greater than the sale price receive a unit of the good and pay the randomly drawn sale price (Noussair, Robin and Ruffieux, 2004). In this experiment, subjects must state their ‘€-bid’ and if the sale price is lower than their bid, they receive the notebook as a ‘payment’; otherwise, they receive a cash prize equivalent to the ‘sale price’. In this sense, respondents that value the notebook highly are more likely to receive the notebook than the cash prize, and respondents that do not value the notebook are more likely to receive the cash prize. The bid therefore becomes a way for participants to state their preference between the notebook and cash.

This incentive makes the WTP question less hypothetical, since there is a real possibility of obtaining the item in question. Moreover, all participants have the chance to be considered for the prize, since the draw

is random; and out of the nine randomly selected participants, all participants receive a prize depending on their stated preferences.

3.3.2 General incentive

At the start of the survey, respondents are told that they can vote on a charity at the end of the survey, and that the winning charity will receive a donation of €20. This incentive is based on the premise that respondents either care about goodwill, or they envision the donation as a payment by the experimenter in exchange for their time. The payment represents a donation made in the collective name of the participants. The incentive is therefore partially dependent on the theory of reciprocity, which states that individuals have a strong instinct for reciprocity and mutual support (Dolan, Hallsworth, Halpern, King and Vlaev, 2010). Moreover, the charity vote is portrayed as a kind of ‘competition’ and is thus expected to trigger engagement (Service et al., 2014).

The vote is placed at the end of the survey, so that respondents are more likely to participate until the end of the survey and to focus on all the questions. The three foundations that were selected for the charity vote fall in line with the theme of the survey but target different causes to make the choice more personal. “The Ocean Cleanup” targets ocean plastic pollution, “The Plant a Tree Foundation” aims to tackle climate change through reforestation projects and “The Footprint Network” measures human impact on the environment. In addition, links to the three charities are provided, offering the possibility to collect information on the charities.

Section 4 – Overview of data

Out of the 315 individuals who opened the link to the survey, 237 completed a significant portion of the survey (93%-100%). The remaining 78 participants responded to 33% or less, thereby providing insufficient information to be included in the analysis. As such, the total sample size equals 237 individuals (see Tables A1.1 and A1.2 for a demographic overview of the sample).

Out of the 237 individuals in the sample, 129 (54.43%) were presented with the affective priming exercises and 108 (45.57%) were presented with the analytical priming exercises. In the first priming exercise, the top three words that were used to describe the System 1 priming image were: “friends”, “happiness” and “happy” (47, 44 and 30 times, respectively). Meanwhile, respondents in the alternative treatment group used the following top three words to describe a professor: “smart”, “intelligent” and “knowledgeable” (13, 13 and 9 times respectively). In the latter case, participants provided 209 different words or phrases to describe a professor (324 in total), while in the former case, participants provided 107 different words or

phrases to describe the image (387 in total). For an overview of these words and their frequencies¹⁰, see Figures A1.1 and A1.2.

Following the priming exercises, participants were asked to provide their maximum WTP for an ‘FSC-certified’ notebook. Many respondents (71.30%) did not have pre-existing knowledge of the FSC label, but a short description of the label was provided to everyone. Respondents in both treatment groups reported WTP values ranging between €1 and €4.50. The average WTP in the first group (System 1 treatment group) is approximately €2.79, while the average WTP in the second group (System 2 treatment group) is approximately €2.89 (see Tables A1.3 and A1.4). Furthermore, when respondents were asked about their overall concern for environmental topics, the majority (63.29%) stated that it generally cares about such topics, while only a small share (5.90%) of the sample does not care about such topics (see Table A1.5).

Additional data was collected on six determining factors of WTP. Each factor was measured on a five-point Likert scale, ranging from “Not at all” to “A great deal”. The answers provided by the respondents are split by factor and by treatment group in Tables A1.6 to A1.11. Looking at the results of these questions, certain similarities may be observed between the two treatment groups. Namely, the highest proportion of participants in each of the two treatment groups provided the same ranking. For example, when respondents were asked whether climate change and environmental deterioration *is affecting them or has affected them in the past*, the largest share of participants in both treatment groups answered, “a moderate amount” (29.69% and 30.84% of the System 1 and System 2 groups, respectively). It is thus possible to conclude that people feel somewhat affected by climate change but fear it “a great deal”. Furthermore, people are not sceptical about climate-related risks, they feel positive about altruistic actions and they feel responsible for addressing climate change; but they only *moderately* trust ethical labelling.

Section 5 – Methodology and results

5.1 The effect of priming on willingness-to-pay

The collected data aims to provide insights into the hypotheses that have been underlined in Section 2. The primary focus of the present research is to identify whether DPT affects people’s WTP for environmentally friendly products. As such, the main goal is to investigate whether individuals exposed to System 1 priming report a higher WTP than individuals exposed to System 2 priming:

¹⁰ The frequencies are illustrated by the relative sizes of the words (e.g., a high-frequency word is shown in larger font than a low-frequency word). The word clouds only include the words that were used most often by respondents.

Hypothesis 1: Participants primed with a System 1 mind-set will have a higher willingness-to-pay than participants primed with a System 2 mind-set.

To test this hypothesis, a Mann-Whitney U test was performed using the WTP data (variable *WTP*). The Mann-Whitney U test assesses the hypothesis that two independent samples originate from populations with the same distribution (Mann and Whitney, 1947). As such, the two groups (*System 1* and *System 2*) are compared to one another, since the design of the experiment is ‘between-subject’. The test uses a ‘rank-sum’ method by pooling all WTP data and ranking all observations in increasing order. The sum of the ranks of the two samples should therefore be similar if the samples have a similar distribution. The Mann-Whitney U test can be used in the context of this research because the main dependent variable (*WTP*) is measured at the continuous level, the independent variable (*Treatment*) consists of two categorical, independent groups (*System 1* and *System 2*) and observations are independent from one another¹¹.

The result of the test suggests that the two samples have a similar distribution and thereby come from the same population. The null hypothesis (H0: the distributions of the two groups are equal) could not be rejected at a 10% confidence level (p-value = 0.4220, Table A2.1). Ultimately, if the distributions of the two groups are equal, the Mann-Whitney U test shows that the mean ranks of the two groups are not significantly different¹². The distributions of the two samples may be observed graphically in Figures 2 and 3 below:

¹¹ The design of the experiment ensured that each person’s stated preference (i.e., reported WTP) was independent from another’s.

¹² According to a (two-tailed) post-hoc power analysis of the Mann-Whitney U test using the G*Power software tool, the power of the study given the sample sizes of the two treatment groups, an α of 0.05 and a standard effect size of 0.5 is approximately 0.96. However, when computing the effect size prior to performing the power analysis, the power of the study becomes approximately 0.13, since the effect size obtained based on the sample sizes, the means and standard deviations of each treatment group is small (see Table A2.9). Consequently, the study is under-powered and detecting an economically significant effect would require a larger sample size.

Figure 1: Distribution of WTP under the System 1 priming condition (frequencies)

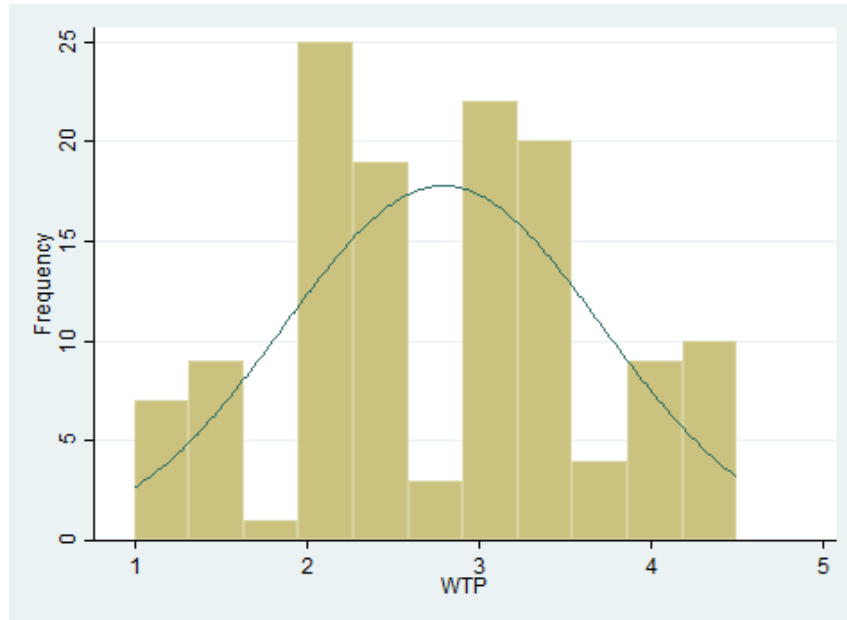
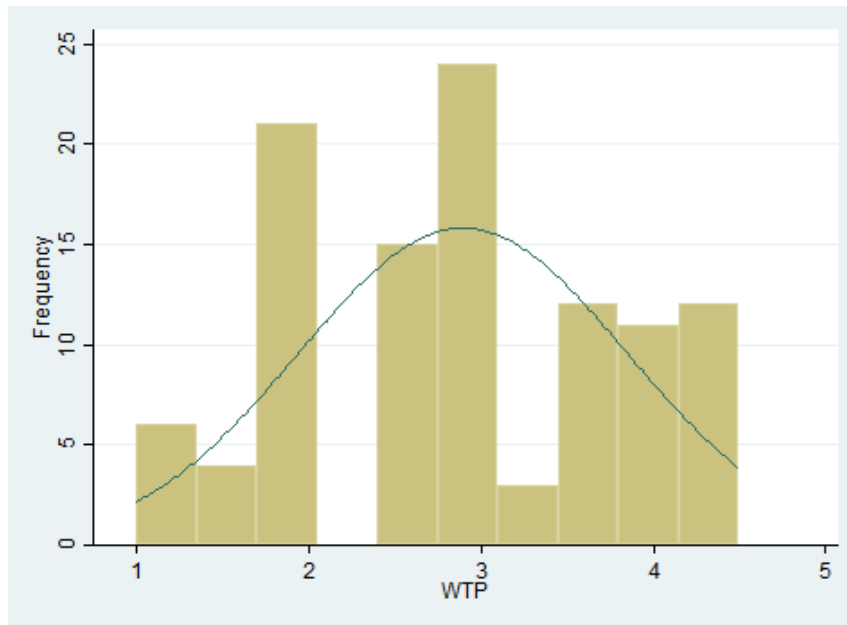


Figure 2: Distribution of WTP under the System 2 priming condition (frequencies)



As can be seen from the normal density curves in the graphs above, the distributions of the System 1 and the System 2 groups appear somewhat similar. In conclusion, results suggest that the two independent samples come from the same population, and thus, priming did not produce statistically different WTP values between subjects primed with a System 1 mind-set and subjects primed with a System 2 mind-set.

The data seems to also meet the requirements for a parametric test: the observations are independent and follow a normal distribution, the two samples have equal variances and *WTP* was measured at a ratio scale (see Tables A2.2 to A2.4). Consequently, an unpaired t-test was performed in addition to the Mann-Whitney U test. The null hypothesis of the t-test could not be rejected at a 10% confidence level (p-value = 0.3957, Table A2.5), suggesting that there is no statistically significant difference between the means of the two samples, and therefore, priming did not influence the WTP of the two groups.

It is to be noted that the unpaired t-test serves as a secondary test to the Mann-Whitney U test. However, both tests, as well as the graphical representations of the distributions of the two samples, imply that Hypothesis 1 can be rejected.

5.2 The drivers of willingness-to-pay

The secondary goal of this study is to consider the possible avenues through which priming affects WTP. Although Hypothesis 1 was rejected, the information collected on the determinants of WTP may still provide useful insights on WTP in the context of environmentally conscious purchasing decisions. Thus, the secondary hypotheses specified in Section 2 remain to be tested:

Hypothesis 2: The effect of 'personal experience', 'fear' and 'altruism', in comparison to the effect of 'scepticism', 'awareness of responsibility' and 'trust', will be stronger in the System 1 priming scenario.

Hypothesis 3: The effect of 'scepticism', 'awareness of responsibility' and 'trust', in comparison to the effect of 'personal experience', 'fear' and 'altruism', will be stronger in the System 2 priming scenario.

To test these hypotheses, a series of OLS regressions were run. These regressions include the variables on the drivers of WTP, as well as some additional control variables related to the demographic background of the respondents: namely, pre-existing knowledge of the FSC label (*Knowledge_of_FSC*), general environmental concern (*Gen_env_concern*), gender (*Gender*), age (*Age*), occupation (*Occupation*), level of education (*Education*), field of study (*Field_education*), average monthly expenditure (*Expenditure*) and nationality (*European*). For ease of analysis, the variable on nationality was transformed into a dummy variable taking the value 0 for a European nationality and 1 for a different nationality.

Since evidence was found in the literature about a possible relationship between emotional or analytical priming and certain drivers of WTP, it is expected that an interaction exists between *Treatment*¹³ and the various drivers. In other words, the effect of each driver is expected to differ between the two treatments. As such, the main regression (Regression 1), addressing both Hypothesis 2 and Hypothesis 3, takes on the following equation:

$$\begin{aligned}
 WTP = & \beta_0 + \beta_1 * Treatment + \beta_2 * Pers_experience + \beta_3 * Fear + \beta_4 * Altruism + \beta_5 * \\
 & Scepticism + \beta_6 * Responsibility + \beta_7 * Trust + \beta_8 * (Treatment * Pers_experience) + \beta_9 * \\
 & (Treatment * Fear) + \beta_{10} * (Treatment * Altruism) + \beta_{11} * (Treatment * Scepticism) + \\
 & \beta_{12} * (Treatment * Responsibility) + \beta_{13} * (Treatment * Trust) + \beta_{14} * Knowledge_of_FSC \\
 & + \beta_{15} * Gen_env_concern + \beta_{16} * Gender + \beta_{17} * Age + \beta_{18} * Occupation + \beta_{19} * Education + \\
 & \beta_{20} * Field_education + \beta_{21} * European + \varepsilon
 \end{aligned}$$

Another equation (Regression 2) focuses on only three determinants of WTP, namely *Pers_experience*, *Fear* and *Altruism*, in line with the prediction that these three determinants are accentuated by System 1 priming. A third equation (Regression 3) focuses on the remaining three determinants (*Scepticism*, *Responsibility* and *Trust*), expected to be accentuated by System 2 priming. Moreover, since Hypothesis 1 was rejected, it is interesting to look at the drivers of WTP independent from priming. Therefore, the fourth and final equation does not include interaction terms (Regression 4).

The results of the four regressions may be observed in Table 1 below. The effects of the control variables mentioned above are excluded from the table, but they may be found in Table A2.6. Regressions 1 through 3 are also accompanied by a linear combination of coefficients analysis (Table A2.7) testing the significance of the drivers of WTP under the System 2 condition (i.e., when *Treatment* = 1).

¹³ The variable *Treatment* is a dummy variable taking the value 0 for individuals that were allocated to the System 1 group, and 1 for individuals that were allocated to the System 2 group.

Table 1: Partial results of the OLS regression analysis, four models

	(1)	(2)	(3)	(4)
Constant	2.107958*** (0.4827762)	2.210276*** (0.4134069)	2.431181*** (0.450585)	1.958066*** (0.4539117)
Treatment	-0.2379439 (0.539942)	-0.1097056 (0.4928553)	-0.2138156 (0.4483894)	0.0524427 (0.1198968)
Personal experience	-0.1450985* (0.0839635)	-0.1441436* (0.0817475)		-0.1740604*** (0.064632)
Fear	0.226749** (0.0869881)	0.2230836** (0.0888359)		0.1587132** (0.07326)
Altruism	0.0655786 (0.1093274)	0.0658466 (0.096702)		0.1107578 (0.0797438)
Scepticism	0.0019853 (0.0634874)		-0.0097892 (0.0621285)	0.0032304 (0.0435051)
Responsibility	0.0390739 (0.0997841)		0.1114074 (0.0949298)	0.1274174* (0.0769135)
Trust	-0.0041258 (0.090484)		0.0147643 (0.0867349)	0.0125916 (0.0732479)
Treatment x Personal experience	-0.0819075 (0.1338055)	-0.0077378 (0.1306249)		
Treatment x Fear	-0.1327051 (0.147624)	-0.089477 (0.1507275)		
Treatment x Altruism	0.0924403 (0.1521467)	0.1542678 (0.1345021)		
Treatment x Scepticism	-0.0069439 (0.085749)		-0.0274533 (0.0867349)	
Treatment x Responsibility	0.2103657 (0.1529407)		0.0847168 (0.1386682)	
Treatment x Trust	0.0421679 (0.1571034)		0.0287939 (0.1566455)	
	<i>For the full set of results, refer to Table A2.6 in Appendix A2.</i>			

Robust standard errors are reported in parentheses.

*, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Based on these results, it is possible to make some inferences on what drives WTP. According to Regressions 1 and 2, WTP was impacted by ‘personal experience’ and ‘fear’ in the System 1 priming scenario. Meanwhile, under the System 2 priming condition, ‘personal experience’ (Regression 1), ‘altruism’ (Regression 2) and ‘responsibility’ (Regression 3) significantly affected WTP. Consequently, priming accentuated different drivers of WTP, but not as was predicted by Hypotheses 2 and 3. It is interesting to note that ‘personal experience’ significantly influenced WTP in both priming scenarios and that the effect was stronger under the System 2 condition. This can be because respondents primed with a System 2 mind-set reported having experienced the effects of climate change and environmental deterioration significantly more than respondents primed with a System 1 mind-set (as shown in Table A2.8 and Figures A2.1 and A2.2).

Nevertheless, the model with the greatest explanatory power remains Model 4. This model fits the data best, as it has the highest adjusted R^2 amongst the four regressions (0.1071 in comparison to 0.0975, 0.1016 and 0.0542 for Regressions 1, 2 and 3, respectively). This falls in line with the conclusion that priming did not influence WTP.

It is therefore possible to conclude that ‘personal experience’ negatively influences WTP and ‘fear’ and ‘responsibility’ positively influence WTP in the absence of priming. Regression 4 shows that a one-unit increase in ‘personal experience’ lowers WTP by approximately €0.17, on average (p-value = 0.008, significant at $\alpha = 0.01$); meanwhile, a one-unit increase in ‘fear’ and ‘responsibility’ leads to an average WTP increase of approximately €0.16 and €0.13, respectively (p-value = 0.031 and p-value = 0.099, significant at $\alpha = 0.05$ and at $\alpha = 0.10$, respectively). This implies that, contrary to what was found in the literature, the more people feel affected by climate change and environmental deterioration, the less they are likely to pay for environmentally conscious products, such as the FSC-labelled notebook. However, in line to what was found in the literature, the more people fear climate change and environmental deterioration, the more they are willing to pay for environmentally conscious products. The same relationship is valid for higher levels of ‘personal responsibility’.

Keeping these findings in mind, Hypotheses 2 and 3 can be rejected. Although certain determinants were expected to be accentuated by one kind of priming and the remaining determinants by the second kind of priming, this relationship was not found in its entirety.

An additional finding which goes beyond the scope of the experiment is that males are willing to pay a significantly lower amount for the FSC-labelled notebook in comparison to females. This significance was maintained across all models (see Table A2.6). No such relationship between gender and ethical consumption was found in previous literature on green consumerism, however, research on sustainable

behaviour shows that men discount future risks related to the environment more than women (Griskevicius, Cantú and van Vugt, 2012).

It is important to emphasise that these findings are subject to a number of limitations, which will be tackled in the following section.

Section 6 – Limitations

6.1 Lack of experimental control and resulting biases

One of the main limitations to the study is the setting in which the experiment was run. Due to various constraints, the survey was conducted online, and participants were primarily contacted through Facebook. Both private messages and public posts were used to invite participants to take the survey, but this likely diluted the effect of the priming tasks and the level of focus of respondents.

The lack of experimental control or the existence of incidental environmental anchors and cues could have influenced the responses of participants at the time of judgment (Critcher and Gilovich, 2008). It is possible that numbers and emotionally-laden videos and messages in the respondent's surroundings could have driven the respondent to provide biased answers. For example, the priming exercise that was used in the first priming task for participants in the System 1 treatment group was based on the premise that 'happy faces' compel more positive valuations (Murphy and Zajonc, 1993). However, people are constantly exposed to emoticons on Facebook, meaning that people in the System 2 treatment group could have been exposed to 'happy faces' as well.

The answers provided by the respondents in the first priming stage aligned with what was expected from the priming tasks. Namely, respondents in the System 1 treatment group provided less descriptive words than respondents in the System 2 group (107 vs. 209). This may be explained by the fact that images trigger intuitive responses, while the absence of an image engages the respondent to think more (Amit and Greene, 2012). Furthermore, the most frequently cited words in both treatment groups matched the words that were expected to unconsciously provoke either System 1 or System 2 reactions. Nonetheless, no significant difference was found between the two treatment groups in terms of WTP or determinants of WTP. This could partly be due to environmental factors that could have mitigated the impact of the primes.

Moreover, some of the questions related to what drivers WTP for environmentally friendly products or the general concern for the environment could have been susceptible to an 'experimenter-demand bias' (Cross,

1980). For example, many respondents (64.34% in the System 1 group and 70.36% in the System 2 group¹⁴) reported feeling positive about contributing to causes that benefit others and that reduce the negative consequences of climate change; however, this variable (*Altruism*) does not seem to significantly affect WTP in the most relevant regression (i.e., Model 4). Furthermore, when asked about their concern for the environment, only 5.91% of participants reported not being concerned for the environment. Since the priming text that preceded these questions highlighted the urgency of addressing climate change, it is possible that most participants provided answers in line with what was socially, and therefore, ‘experimentally’, expected from them.

6.2 The construction of the experiment

Other limitations relate to the design of the experiment. To begin with, it is possible that having two stages of priming may have reversed the effect of the first stage of priming, especially in the System 2 scenario. Having already placed participants in an ‘analytical’ mind-set after the first priming task and being confronted with a text containing scientific facts about the dangers of climate change, may have made the purchase of the FSC-labelled notebook appear ‘logical’. In other words, having used a priming text related to the topic of the experiment (i.e., climate change) might have diluted the effect of what would have been a solicitation of unconscious triggers through an unrelated priming exercise. Although this type of text was used in van Gelder et al.’s (2009) experiment successfully, this method of priming was applied to a different type of risk-taking behaviour in the present study. Taking risks that impact one’s own life directly and with quick feedback, as was the case in van Gelder et al.’s (2009) experiment, is different than taking risks that collectively lead to a global threat. Consequently, using this type of priming exercise may or may have not been suitable for the analysis of *environmental* risk-taking behaviour.

Next, at the start of the WTP question, participants are provided with some instructions on what is required from them. Participants are also reminded of the importance of stating a truthful price. The presence of this short introduction to the WTP question may have interfered with the effect of priming as well, especially in the case of respondents assigned to the System 1 group. Calling attention to the importance of the question may have ‘awakened’ System 2, and may have initiated a ‘meditated’, as opposed to ‘intuitive’, response.

In addition, the incentive that was used may not have been as effective as expected. Using a notebook as an incentive may have been perceived differently by different people, depending on the *attractiveness* of the item to each specific individual. Moreover, no information was collected on any determinants of WTP that

¹⁴ Based on respondents who reported “a lot” or “a great deal”.

are unrelated to the ethical component of the item in question, such as the need for the product or its aesthetic appeal. Such information should be considered for future research. Furthermore, selecting nine winning participants out of the total sample means that the chances of winning something are relatively small. Although participants were asked to provide a value for a *real* item, the low chances of obtaining the item, even given a high WTP, may have reduced the effect of the incentive.

Lastly, it would have been interesting to divide the sample into two treatment groups and one control group, to be able to draw conclusions on WTP for environmentally conscious products in the absence of any priming task. This would have been especially relevant because the priming portion of the survey made respondents reflect on the importance of dealing with climate change. However, prior to setting up the experiment, it was difficult to predict the number of participants that could be recruited. Having had three sample groups and too few participants would have further deteriorated the power of the statistical analyses. As such, further research could investigate the WTP of participants that are not primed, nor provided with information about climate change or environmental deterioration.

6.3 Limitations to the analysis of the data and the underlying conclusions

First, it is important to note that the data obtained could have been analysed in a different way or additional tests and more elaborate regressions could have been run. Furthermore, the data that was collected did not target a specific audience, which may have both positive and negative influences on the results obtained. For example, having a wide variety of candidates rather than a more uniform sample may make the results of the analysis more applicable to the wider population but it may also imply an increase in the number of *unobserved factors* influencing WTP. The adjusted R^2 for Model 4 was higher than that of the other models, but it showed that the regression only explained approximately 11% of the variation in the response variable around its mean. This could be both due to a high number of variables not accounted for and to the type of analysis that was performed.

Second, the results highlighted in Section 5 raise certain questions about the external validity of the findings. As mentioned above, it is difficult to relate the findings to general *ethical consumer behaviour*, since the purchase of an FSC-labelled notebook might not represent this well. In other words, the notebook might not be representative of all pro-environmental purchasing choices. The latter could perhaps be better represented by a basket of goods, general purchasing behaviour observed over time or a choice between ethical and non-ethical products. Furthermore, due to a lack of appropriate variables, it is difficult to understand what really drove participants' WTP for the specific notebook used in this study.

Consequently, not having found a relationship between WTP and priming in the context of this research does not necessarily mean that System 1 or System 2 priming does not have an impact on ethical consumption. Rather, it should be further investigated.

Section 7 – Discussion

The regression analysis demonstrated that the more people experience the impact of climate change and environmental deterioration, the less they are likely to pay for the FSC-labelled notebook and, perhaps, other similar products. The effect of ‘personal experience’ was the strongest amongst all the determinants that displayed significant p-values. Traditionally, it is assumed that people discount climate change-related threats since they are expected to affect them far in the future (Gifford, 2013; Rowson, 2013). ‘Discounting’ is thus one reason that induces a lack of willingness-to-take-action. However, in this case, it appears people are conscious of the negative consequences of climate change and have already experienced the risks of environmental deterioration. It is therefore likely that people feel overwhelmed by the atmospheric and environmental changes they are witnessing (The World Bank, 2015); and, due to the scale of the problem, people may feel that any contribution they make is too small (Thøgersen and Ölander, 2006; Udéhn, 1993). Alternatively, people might not know how to collectively mobilise a meaningful response to climate change and pass on the burden to policymakers. According to Rowson and Corner (2014), “a major cause and consequence of this inertia is that even those who broadly accept the facts of climate change struggle to see themselves either as part of the problem or the solution”. Therefore, people may feel that purchasing an FSC-labelled notebook will not contribute to reducing climate change. Although it is assumed that ethical purchasing choices are a means to *taking action*, people might not perceive it this way. This may also be reinforced by the fact that purchasing choices are only relevant if a large share of the population participates (Liebe et al., 2011); which is not something that consumers have a guarantee over.

Another interesting remark is that a large proportion of participants “moderately” trust ethical labelling. Therefore, it might be important to raise public awareness about the positive impact that consumers can have on the environment through their purchasing decisions. It might also be important to encourage consumers to pay closer attention to ethical labels. Nevertheless, people need to form trust in such labels. This may be done through a higher level of transparency from labelling institutions and organisations, as well as a re-framing of communications. According to Cialdini (2003), such communications are more persuasive when they focus on what other people are doing. In this context, it is crucial for people to know that others are also making similar purchasing decisions.

In Section 5, it was also noted that respondents assigned to the System 2 treatment group felt the impact of climate change even more than participants in the System 1 group; thereby, their WTP was even lower. This finding could be linked to the type of priming exercise that was used to elicit System 2 cognition. Respondents were asked to retrieve an image of a professor from their memory and provide three characteristics to describe the professor. The premise of this priming method is based on the retrieval of a stereotypical image from memory. However, based on the answers provided by respondents, it is possible that certain individuals searched their memory for a specific professor. For example, the characteristics “charismatic”, “funny” and “motherly/fatherly” are not necessarily related to the stereotype of an unknown professor but rather to an *existing* professor that left a positive mark on a student. Having searched one’s memory for a specific image rather than a stereotypical image might have made instances of climate change related episodes more vivid in the respondent’s memory. Alternatively, it is possible that people in the System 2 group felt more overwhelmed by the phenomenon since the priming text they were asked to read emphasised scientific facts and figures. Since most respondents do not have a scientific background, this could have made their purchasing decision appear even more ‘meaningless’.

As such, the traditional System 2 priming exercise produced unexpected effects that should be further interrogated. Moreover, it has often been stated that presenting individuals with statistical facts and figures does not trigger action (Rowson and Corner, 2014). Perhaps this is because such information increases the perceived *size* of the problem. The solution might not be to use emotions to trigger action, as was predicted by the present research, but to make problems seem smaller or more operable.

Section 8 – Conclusion

The central aim of this paper was to determine whether useful insights from dual-process theory can contribute to encouraging more environmentally friendly purchasing decisions. The scope of the research was two-fold: to determine whether people’s intuitive mind (System 1) induces a higher WTP than people’s analytical mind (System 2), and to understand whether certain pre-defined factors drive this difference in valuation. Findings suggest that there is no significant difference between the WTP of participants primed with a System 1 mind-set and those primed with a System 2 mind-set. Consequently, it is not possible to conclude that eliciting emotional and intuitive cognitive responses from consumers will induce them to make more ethical purchasing choices. In-line with this verdict, the pre-selected drivers of WTP were not affected by priming. It was expected that the difference in valuation between System 1 and System 2 would be the result of different drivers being influenced by priming. However, this relationship was not found.

Nonetheless, certain drivers of WTP were found to have a significant impact on WTP, in a model that excluded any possible interaction effect between the treatment variable and the various drivers of WTP. The most significant driver of WTP for environmentally friendly products was found to be ‘personal experience’. As such, having experience with climate change related risks negatively influences people’s WTP. This may be due to the fact that climate change is perceived as an overwhelmingly large *threat*, or consumers do not believe they can make a positive contribution with their purchasing choices.

Further research should take these findings into consideration. On the one hand, the setting and the design of the experiment can be improved. More variables can be accounted for; there could be more control over the environment in which the experiment takes place; and different priming tasks could be used. Changing the landscape of the experiment will also allow for more efficient priming exercises, such as videos, to be used. It would also be interesting to use different items as an incentive since it is not certain that the FSC-labelled notebook used in this study is representative of general ethical consumer choices. On the other hand, it is important to investigate why ‘personal experience’ has such an important effect. The conjectures put forth in the Discussion section of this paper should be tested, as well as the persistence of the effect in the case that the experiment is repeated.

This study is not without limitations, and it is therefore difficult to draw definite conclusions on whether insights from DPT can improve consumer decision-making in the direction of more ethical choices. However, there is enough evidence to suggest that invoking ‘emotions’ versus ‘analysis’ can impact such choices. It remains therefore a crucial area of research since the ultimate scope is to find ways to incite more pro-environmental action at the consumer or individual level.

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Appendices

Appendix A1 – Descriptive statistics and figures

Figure A1.1: Words used to describe the image in the first System 1 priming exercise



Figure A1.2: Words used to describe a professor in the first System 2 priming exercise



Table A1.1: Descriptive statistics of control variables

Variable	Obs.	Mean	Std. Deviation	Min.	Max.
Gender	237	0.4050633	0.4919432	0	1
Age	237	24.53165	6.041878	15	57
European	237	0.3248945	0.4693266	0	1
Occupation	237	0.4135021	0.5947396	0	2
Education	237	1.970464	1.239863	0	5
Field of education	237	3.236287	3.541981	0	10
Expenditure	237	2.21519	1.440964	0	5
Environmental concern	237	0.4261603	0.603513	0	2
Knowledge of FSC label	237	0.7130802	0.4532811	0	1

Table A1.2: Demographic overview of the sample

Variable		Obs.	Percentage of sample
Gender	Female	141	59.49%
	Male	96	40.51%
Nationality	European	160	67.51%
	Non-European	77	32.49%
Occupation	Student	152	64.14%
	Employed	72	30.38%
	Other	13	5.49%
Education	High School	24	10.13%
	Bachelor's Degree	91	38.40%
	Other post-High School	7	2.95%
	Master's degree	103	43.46%
	PhD	7	2.95%
	Other	5	2.11%
Field of education	Business or Management	67	28.27%

	Economics	48	20.25%
	Marketing or Communications	25	10.55%
	Psychology or Behavioural Science	14	5.91%
	Finance	12	5.06%
	Political Science	10	4.22%
	Arts or Culture	9	3.80%
	IT or Computer Science	7	2.95%
	Law	8	3.38%
	Health	8	3.38%
	Other	29	12.24%
Expenditure	< €300	27	11.39%
	€301-€600	51	21.52%
	€601-€900	71	29.96%
	€901-€1,200	45	18.99%
	€1,201-€1,500	18	7.59%
	> €1,501	25	10.55%

Table A1.3: Descriptive statistics of WTP and determinants of WTP for the System 1 treatment group

Variable	Obs.	Mean	Std. Deviation	Min.	Max.
WTP	129	2.790456	0.920516	1	4.5
Fear	129	2.852713	1.139495	0	4
Personal experience	129	2.20155	1.127635	0	4
Altruism	129	2.75969	0.990385	0	4
Scepticism	129	0.9612403	1.239979	0	4
Responsibility	129	2.387597	1.070266	0	4
Trust	129	2.085271	0.9603955	0	4

Table A1.4: Descriptive statistics of WTP and determinants of WTP for the System 2 treatment group

Variable	Obs.	Mean	Std. Deviation	Min.	Max.
WTP	108	2.894259	0.9527719	1	4.5
Fear	108	2.962963	0.9562967	0	4
Personal experience	108	2.453704	1.13058	0	4
Altruism	108	2.907407	0.9622504	0	4
Scepticism	108	0.9722222	1.321698	0	4
Responsibility	108	2.555556	0.9699536	0	4
Trust	108	2.101852	0.7604698	0	4

Table A1.5: Distribution of answers to the question on general environmental concern (# respondents, % of category)

General environmental concern	Yes	Somewhat	No
System 1	75 (50.00%)	43 (58.90%)	11 (78.57%)
System 2	75 (50.00%)	30 (41.09%)	3 (21.43%)
	150	73	14

Table A1.6: Distribution of answers to the question on 'personal experience' (# respondents, % of treatment group)

Personal experience	System 1	System 2
Not at all	8 (6.20%)	6 (5.55%)
A little	29 (22.48%)	15 (13.89%)
A moderate amount	39 (30.23%)	33 (30.55%)
A lot	35 (27.13%)	32 (29.63%)
A great deal	18 (13.95%)	22 (20.37%)
	129	108

Table A1.7: Distribution of answers to the question on ‘fear’ (# respondents, % of treatment group)

Fear	System 1	System 2
Not at all	4 (3.10%)	1 (0.92%)
A little	14 (10.85%)	6 (5.55%)
A moderate amount	28 (21.70%)	27 (25.00%)
A lot	34 (26.36%)	36 (33.33%)
A great deal	49 (37.98%)	38 (35.18%)
	129	108

Table A1.8: Distribution of answers to the question on ‘altruism’ (# respondents, % of treatment group)

Altruism	System 1	System 2
Not at all	2 (1.55%)	1 (0.92%)
A little	13 (10.08%)	9 (8.33%)
A moderate amount	31 (24.03%)	22 (20.37%)
A lot	51 (39.53%)	43 (39.81%)
A great deal	32 (24.81%)	33 (30.55%)
	129	108

Table A1.9: Distribution of answers to the question on ‘scepticism’ (# respondents, % of treatment group)

Scepticism	System 1	System 2
Not at all	68 (52.71%)	62 (57.41%)
A little	23 (17.83%)	14 (12.96%)
A moderate amount	21 (16.28%)	11 (10.18%)
A lot	9 (6.98%)	15 (13.89%)
A great deal	8 (6.20%)	6 (5.55%)
	129	108

Table A1.10: Distribution of answers to the question on ‘responsibility’ (# respondents, % of treatment group)

Responsibility	System 1	System 2
Not at all	7 (5.43%)	2 (1.85%)
A little	20 (15.50%)	12 (11.11%)
A moderate amount	35 (27.13%)	37 (34.25%)
A lot	50 (38.76%)	38 (35.18%)
A great deal	17 (13.18%)	19 (17.59%)
	129	108

Table A1.11: Distribution of answers to the question on ‘trust’ (# respondents, % of treatment group)

Trust	System 1	System 2
Not at all	9 (6.98%)	1 (0.92%)
A little	20 (15.50%)	18 (16.67%)
A moderate amount	58 (44.96%)	63 (58.33%)
A lot	35 (27.13%)	21 (19.44%)
A great deal	7 (5.43%)	5 (4.63%)
	129	108

Appendix A2 – Tests and results

Table A2.1: Mann-Whitney U test for equality of distributions (WTP)

	System 1 (Treatment =0)	System 2 (Treatment = 1)
Observations	129	108
Rank sum	14,932	13,271
Expected	15,351	12,852
z		-0.803
Prob > z 		0.4220

Table A2.2: Shapiro Wilk W test for normal data (System 1)

	WTP
Obs.	129
W	0.99436
V	0.577
z	-1.239
Prob. > z 	0.89226

Table A2.3: Shapiro Wilk W test for normal data (System 2)

	WTP
Obs.	129
W	0.99449
V	0.485
z	-1.611
Prob. > z 	0.94637

Table A2.4: Two-sample variance-comparison test using System 1 and System 2 treatment groups

	System 1	System 2
Obs.	129	108
Mean	2.790465	2.894259
Std. error	0.0810469	0.0916805
Std. deviation	0.920516	0.9527719
f		0.9334
Two-tailed Prob. (F<f)		0.7062

Table A2.5: Unpaired t-test using System 1 and System 2 treatment groups

	System 1	System 2
Obs.	129	108
Mean	2.790465	2.894259
Std. error	0.0810469	0.0916805
Std. deviation	0.920516	0.9527719
t		-0.8508
Prob. (T > t)		0.3957

Table A2.6: OLS regression analysis of all variables (four models)

	(1)	(2)	(3)	(4)
Constant	2.107958*** (0.4827762)	2.210276*** (0.4134069)	2.431181*** (0.450585)	1.958066*** (0.4539117)
Treatment	-0.2379439 (0.539942)	-0.1097056 (0.4928553)	-0.2138156 (0.4483894)	0.0524427 (0.1198968)
Personal experience	-0.1450985* (0.0839635)	-0.1441436* (0.0817475)		-0.1740604*** (0.064632)
Fear	0.226749** (0.0869881)	0.2230836** (0.0888359)		0.1587132** (0.07326)
Altruism	0.0655786 (0.1093274)	0.0658466 (0.096702)		0.1107578 (0.0797438)
Scepticism	0.0019853		-0.0097892	0.0032304

	(0.0634874)		(0.0621285)	(0.0435051)
Responsibility	0.0390739		0.1114074	0.1274174*
	(0.0997841)		(0.0949298)	(0.0769135)
Trust	-0.0041258		0.0147643	0.0125916
	(0.090484)		(0.0867349)	(0.0732479)
Treatment x Personal experience	-0.0819075	-0.0077378		
	(0.1338055)	(0.1306249)		
Treatment x Fear	-0.1327051	-0.089477		
	(0.147624)	(0.1507275)		
Treatment x Altruism	0.0924403	0.1542678		
	(0.1521467)	(0.1345021)		
Treatment x Scepticism	-0.0069439		-0.0274533	
	(0.085749)		(0.0867349)	
Treatment x Responsibility	0.2103657		0.0847168	
	(0.1529407)		(0.1386682)	
Treatment x Trust	0.0421679		0.0287939	
	(0.1571034)		(0.1566455)	
Knowledge of the FSC label	-0.0548143	-0.1013783	-0.0795426	-0.0847875
	(0.1288549)	(0.1233714)	(0.1287974)	(0.1268171)
Environmental concern	-0.1395566	-0.2019041	-0.1883044	-0.1323473
	(0.1327634)	(0.1233714)	(0.1270365)	(0.1310589)
Gender	-0.2989639**	-0.3006003***	-0.2642501**	-0.2913695**
	(0.1161455)	(0.1146297)	(0.1197046)	(0.114058)
Age	0.0054788	0.0082855	0.007268	0.0077457
	(0.0110015)	(0.010976)	(0.0111025)	(0.0110519)
European	0.0079551	0.0064414	-0.0389286	-0.0080009
	(0.1358887)	(0.1337477)	(0.1360338)	(0.1331302)
Occupation	0.0023804	-0.0031388	-0.0093476	-0.008294
	(0.0988058)	(0.0971977)	(0.0973433)	(0.0988491)
Education	-0.0182242	-0.0193071	-0.0283827	-0.0177665
	(0.0534211)	(0.0528671)	(0.0543289)	(0.0538288)
Field of education	0.0233753	0.0231368	0.0238611	0.0247173
	(0.178396)	(0.0182041)	(0.017897)	(0.0177112)
Expenditure	0.0673051	0.0640674	0.0699305	0.0666406

	(0.0459677)	(0.0451777)	(0.0464075)	(0.0457189)
R-squared	0.1816	0.1625	0.1183	0.1676
Adjusted R-squared	0.0975	0.1016	0.0542	0.1071
Number of observations	237	237	237	237

Robust standard errors are reported in parentheses.

*, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

Table A2.7: Linear combination of coefficients analysis estimating the total effect size under the System 2 priming condition (when *Treatment* = 1)

	(1)	(2)	(3)	(4)
Personal experience	-0.227006**	-0.1518814		
	(0.1031547)	(0.1012746)		
Fear	0.0940439	0.1336066		
	(0.1204026)	(0.1249551)		
Altruism	0.1580189	0.2201145**		
	(0.1125892)	(0.1046594)		
Scepticism	-0.0049586		-0.0372425	
	(0.0600973)		(0.062827)	
Responsibility	0.2494396**		0.1961243*	
	(0.118505)		(0.1123202)	
Trust	0.0380421		0.0435582	
	(0.1278089)		(0.1289201)	

Standard errors are reported in parentheses.

*, **, *** indicates significance at the 10%, 5%, and 1% levels, respectively.

Table A2.8: Mann-Whitney U test for equality of distributions for the 'personal experience' variable, comparison between System 1 and System 2 treatment groups

	System 1 (Treatment =0)	System 2 (Treatment = 1)
Observations	129	108
Rank sum	14,459	13,744
Expected	15,351	12,852
z		-1.752
Prob > z 		0.0798

Table A2.9: Power of the Mann-Whitney U test in Table A2.1 calculated using G*Power (two tails)

Calculated effect size d	0.1069381
Non-centrality parameter δ	0.8012180
Critical t	1.9705958
Power (1-β)	0.1254928

Figure A2.1: Distribution of ‘personal experience’ results under the System 1 priming condition (frequencies)

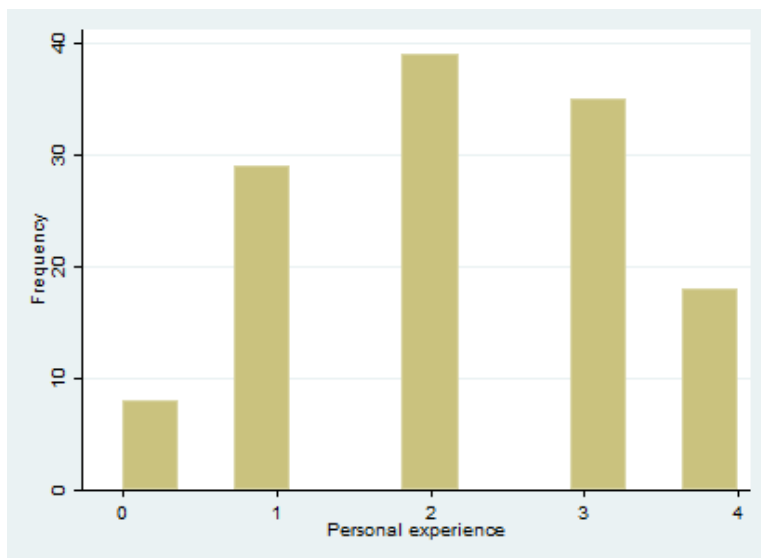
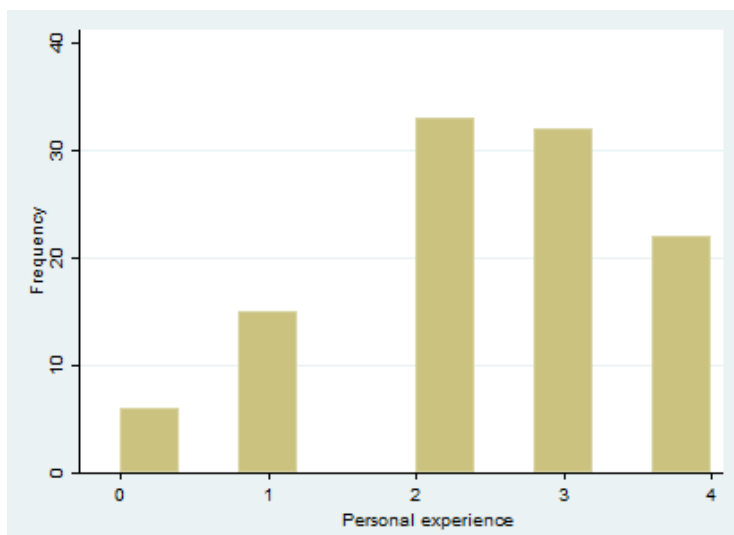
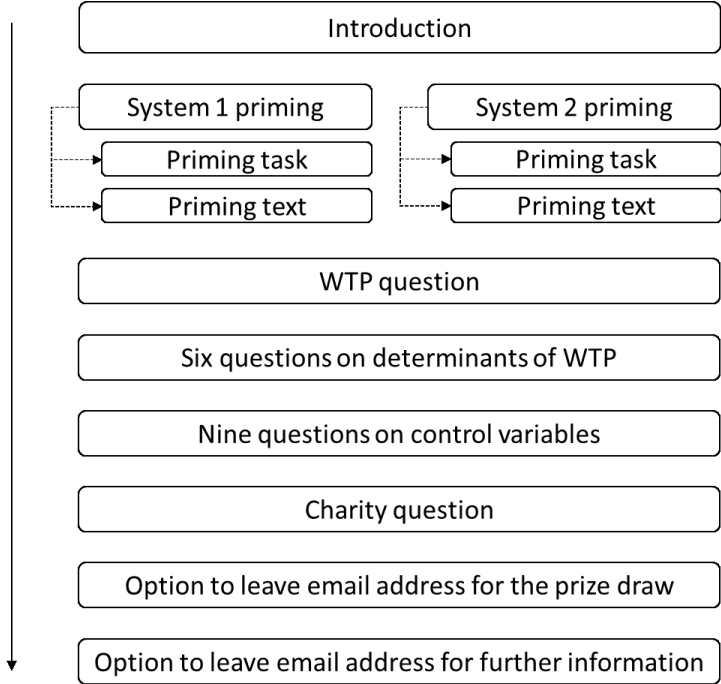


Figure A2.2: Distribution of ‘personal experience’ results under the System 2 priming condition (frequencies)



Appendix A3 – Survey design

Figure A3.1: Survey flow



Appendix A4 – Survey transcript

Start of Block: Introduction

Thank you for opening this link! The survey will only take a **few minutes** of your time.

As part of this survey, you will be asked to state the maximum amount that you are willing to pay for a notebook. Depending on the answers provided, **nine participants will have the opportunity to win the notebook or some cash**. It is therefore in your best interest to provide an honest and truthful value.

Additionally, to thank all participants for taking this survey, **20 Euros will be donated** to a charity that you can vote on at the end of this survey. The charity with the most votes will receive the donation.

Please note that all information retrieved from this survey is for academic purposes only and all data will be treated with confidentiality.

If you have any questions or comments regarding the survey, please email them to esemasterthesis@gmail.com.

End of Block: Introduction

Start of Block: Analytical priming

List 3 characteristics that you associate with a professor. They can be related to a professor's job, lifestyle, personality, etc.

- 1. _____
- 2. _____
- 3. _____

Page Break

Timing

- First Click (1)
 - Last Click (2)
 - Page Submit (3)
 - Click Count (4)
-

Please take a moment to read the following text, the 'next' button will appear shortly:

The number of people talking about climate change has increased in recent years. The Earth's average surface temperature has risen by 1.1°C since the late 19th century and 97% of scientists agree that this global warming trend is evidently caused by human activity through the emission of CO₂, CH₄ and N₂O,

among other substances. Moreover, 16 out of the 17 warmest years on record have taken place since 2001, with 2016 being the warmest year on record.

Limiting future CO2 emissions is important, but actively removing existing CO2 from the atmosphere is equally important. Research argues that trees are the best technology to do so, as they balance the earth's water cycle and absorb CO2. Over 2 billion hectares of degraded land have been identified as having the potential for forest restoration, which, in turn, can reduce the chances of further global warming.

End of Block: Analytical priming

Start of Block: Emotional priming 1

List three characteristics that you associate with this image. They can be related to any aspect of the image.

- _____
- _____
- _____

Page Break

Timing

First Click (1)

Last Click (2)

Page Submit (3)

Click Count (4)

Please take a moment to read the following text, the 'next' button will appear shortly:

People's anxiety regarding climate change has gone up in recent years. More and more scientists have expressed worry about the rise in the Earth's surface temperature over the past centuries and they agree that the global warming trend is evidently caused by human activity through the emission of dangerous substances. Moreover, this century has experienced some of the warmest years in history, with the previous year being the warmest one yet.

Limiting future emissions of dangerous substances is crucial, but actively removing such substances from the atmosphere is equally crucial. Research argues that trees are the best technology to do so, as they balance the earth's water cycle and absorb these dangerous substances. An impressive amount of degraded land has been identified as having the potential for forest restoration, which, in turn, could reduce existing fears regarding global warming.

End of Block: Emotional priming 1

Start of Block: WTP question

You will be asked to state the *maximum price you are willing to pay* for a ring notebook. **Nine randomly selected participants will have the opportunity to win the notebook or some cash, depending on their stated prices.** The details of the mechanism for determining the winners of the notebook or the cash will be discussed at the end of the survey, **but it is in your best interest to report your price truthfully.**



The notebook in the photo above has a **Forest Stewardship Council® (FSC)** label on it. The FSC promotes forest plantations and requires forest managers to protect areas of high conservation value. This product is made of a mix of FSC-certified wood and recycled material.

What is the maximum price you are willing to pay for this notebook? Choose any price between €1.00 and €4.50.

Note: Please separate cent values with a point (a price of X Euros and Y Euro-cents should be entered as X.Y).

End of Block: WTP question

Start of Block: Determinants of WTP

Do you believe that climate change and environmental deterioration have already affected or are affecting you?

- A great deal
 - A lot
 - A moderate amount
 - A little
 - Not at all
-

Are you afraid of the consequences of climate change and environmental deterioration?

- A great deal
 - A lot
 - A moderate amount
 - A little
 - Not at all
-

Do you feel positive about contributing to causes that will benefit others and that will reduce the negative consequences of climate change and environmental deterioration for future generations?

- A great deal
 - A lot
 - A moderate amount
 - A little
 - Not at all
-

Are you sceptical about the negative consequences of climate change and environmental deterioration?

- A great deal
 - A lot
 - A moderate amount
 - A little
 - Not at all
-

Do you feel responsible for addressing climate change and environmental deterioration?

- A great deal
 - A lot
 - A moderate amount
 - A little
 - Not at all
-

Do you generally trust ethical labels?

- A great deal
- A lot
- A moderate amount
- A little
- Not at all

End of Block: Determinants of WTP

Start of Block: Control questions

Now, just a few basic questions about yourself and you may vote for one of three charities that will receive the donation!

Did you know about the FSC label before filling in this survey?

- Yes
 - No
-

Are climate change and environmental wellbeing topics generally important to you?

- Yes
 - No
 - Somewhat
-

What is your gender?

- Male
 - Female
-



What is your age?

What is your nationality?

What is your current occupation?

- Student
 - Employed
 - Other
-

What is your highest level of completed (or ongoing) education?

- High School
 - Bachelor's Degree
 - Other post-High School diploma
 - Master's Degree
 - PhD
 - Other
-

In what main field is your highest obtained (or ongoing) degree?

- Business or Management
 - Economics
 - Marketing or Communications
 - Psychology or Behavioural Science
 - Finance
 - Political Science
 - Arts or Culture
 - IT or Computer Science
 - Law
 - Health
 - Other
-

What is your level of expenditure on an average month (including all expenses)?

- < €300
- €301-€600
- €601-€900
- €901-€1,200
- €1,201-€1,500
- > €1,501

End of Block: Control questions

Start of Block: Charity question

To thank you for your participation, I will donate €20 to one of three environmental charities. Please choose your preferred charity from the options below. The charity with the most votes will receive the donation.

- The Ocean Cleanup:** The foundation develops technologies to extract plastic pollution from oceans and prevent more plastic debris from entering ocean waters. The Ocean Cleanup proposes a larger-scale, passive method of removing marine debris in or near ocean gyres. For more information, please see <https://www.theoceancleanup.com/>. (1)
- The Plant a Tree Today Foundation:** The organisation initiates, develops and manages large-scale reforestation projects countering deforestation and climate change. It also conducts environmental education programmes for schools. For more information, please see <http://www.pattfoundation.org/>. (2)
- The Footprint Network:** The organisation measures human demand on nature as an easy-to-understand number. The Footprint data is used to make more informed policy and investment decisions that can support sustainable development and reduce climate change. For more information, please see <http://www.footprintnetwork.org/>. (3)

End of Block: Charity question

Start of Block: Prize draw question

Please leave your email address below if you want to be considered for the prize draw.

Information on how the winners will be determined: 9 individuals will be randomly selected. A random number between 1 and 4.5 will be drawn for each of the selected participants. If the stated price of the participant is above this randomly selected number, the participant wins the notebook. If the stated

price of the participant is below the randomly selected number, the participant wins the amount of money corresponding to the randomly selected number. More details on this method can be found [here](#).

End of Block: Prize draw question

Start of Block: Email

If you want to find out about the winning charity and the outcome of the experiment, please leave your email address below:

End of Block: Email
