

DIFFERENCES ATTRACT: AN EXPERIMENTAL STUDY OF FOCUSING IN ECONOMIC CHOICE*

Ola Andersson, Jim Ingebretsen Carlson and Erik Wengström

Several behavioural models of choice assume that decision makers place more weight on attributes where options differ more, an assumption we test in a set of experiments. We find that subjects are more likely to choose an option when we add options increasing the maximal difference in the original option's strongest attribute, suggesting that the decision maker's focus is drawn to attributes with a high spread. Additional experiments corroborate this finding. Still, we document that the focusing effect diminishes when options are presented using numbers instead of graphs or when subjects are forced to wait before submitting their answers.

Traditional economic models typically assume rational economic agents with stable individual preferences. Recently, a more complicated account of economic decision making has emerged. One vein in this development is the recognition that people have limited cognitive capabilities, which makes it difficult to consider, and properly evaluate, all aspects of the available options. This may lead people to focus excessively on certain features and attributes 'that stand out'. For example, Schkade and Kahneman (1998) suggest that people overestimate easily observed and distinctive differences when making judgements of the quality of life in different states in the United States. The authors claim that a distinct difference, such as climate, is given disproportionate attention when comparing the quality of life in the Midwest and California. Hence, which attributes attract attention may depend on the set of options under consideration.

More recently, Bordalo *et al.* (2013) and Köszegi and Szeidl (2013) propose models of focusing that build on similar ideas.¹ The two studies use slightly different modelling approaches, but both assume that focusing-prone decision makers are more likely to choose an option if it is attractive in the attribute dimensions that stand out. Such focusing effects could be the cause of many well-known choice patterns, such as time-inconsistent preferences, the Allais paradox and preference reversals (see, for example, Azar, 2007; Bordalo *et al.*, 2012; 2013; Cunningham, 2013; Köszegi and Szeidl, 2013; Bushong *et al.*, 2021). Moreover, firms may exploit focusing effects to shroud or highlight certain attributes, which may have negative implications for competition and welfare

* Corresponding author: Erik Wengström, Department of Economics, Lund University, Box 7080, 220 07 Lund, Sweden. Email: erik.wengstrom@nek.lu.se

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The data and codes for this paper are available on the Journal website. They were checked for their ability to reproduce the results presented in the paper.

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¹ Bordalo *et al.* (2013) use the word 'salience' instead of focusing to denote this phenomenon.

in markets.² To alleviate such negative aspects, understanding how focusing affects choice is crucial.

In this paper, we investigate the underlying principle—suggested by Schkade and Kahneman (1998) and assumed by Köszegi and Szeidl (2013)—that the size of the difference in attributes affects the decision maker's focus. Specifically, Köszegi and Szeidl (2013) presume that individuals increase their focus on the attributes for which the available options differ more.³ We report evidence of such focusing effects from a series of controlled experiments that directly test this key assumption.

To obtain an idea of how the focus-weighted utility suggested by Köszegi and Szeidl (2013) affects choices, consider a store offering different payment schemes to a consumer looking to buy a durable good. Suppose payments are spread over three months, and let $\mathbf{p} = (p_0, p_1, p_2)$ denote the payments today, in one month and in two months, respectively. Initially, the consumer is offered the options of either paying \$100 up front, $\mathbf{p} = (100, 0, 0)$, or pay using a dispersed payment scheme $\mathbf{p}' = (60, 50, 0)$, in which they pay \$60 up front and \$50 in one month. The store would like the consumer to choose the dispersed payment scheme as it earns an additional \$10 (assume a zero interest rate, for simplicity). A focusing-prone consumer attaches more weight to payments in one month as that payment difference between the two options (\$50) is larger than the today payment difference (\$40). Assume that, given these two options, the consumer still elects to pay everything up front. Now, suppose that the store introduces a new payment scheme $\mathbf{p}'' = (0, 0, 120)$, i.e., pay nothing up front, nor in one month, and instead pay \$120 in two months. This new option is not likely to be optimal. Yet, it attracts further attention to the upfront payment (the maximal difference in upfront payment among the options increases from \$40 to \$100), which makes the dispersed payment scheme (\mathbf{p}') seem more attractive compared to paying everything up front (\mathbf{p}). Consequently, a preference reversal may occur such that the consumer now prefers the dispersed payment scheme to the upfront payment, even though these payment options have not changed. Moreover, the store earns an additional \$10.

The model of Köszegi and Szeidl (2013) is most closely related to that of Bushong *et al.* (2021), but they differ in one important aspect. Contrary to Köszegi and Szeidl (2013), they assume that more attention is paid to attributes with small differences rather than large differences. Hence, our study is also an indirect test of their modelling assumptions.

In addition, we test the effect of focusing in relation to the well-known decoy effect, also referred to as the attraction effect (see, e.g., Huber *et al.*, 1982). The decoy effect implies that introducing an irrelevant option, the attributes of which are (asymmetrically) dominated by one option but not by the other options, will increase the likelihood of the dominating option being chosen. Some recent attempts to replicate the decoy effect have failed (Huber *et al.*, 2014; Yang and Lynn, 2014). One potential reason is that there is a conflict between focusing effects and decoy effects. To test this, we construct choice sets in which decoy and focusing yield different predictions, shedding light on focusing as a potential constraint on the decoy effect.

We present evidence from a series of experiments with over 1,900 subjects collected using the Amazon Mechanical Turk (MTurk) online labour market.⁴ The subjects were presented with a

² For related discussions on bounded rationality and its impact on competition and welfare, see Gabaix *et al.* (2006), Akerlof and Shiller (2015), Grubb (2015) and Bordalo *et al.* (2016).

³ Bordalo *et al.* (2013) instead assume that the focusing weight of a particular attribute of an option is a function of how the attribute departs from the average of this attribute across all options in the consideration set. This approach is somewhat different and in our experiment, Bordalo *et al.* (2013) and Köszegi and Szeidl (2013) give the same predictions in approximately 50% of the decision tasks presented to subjects. More details can be found in Online Appendix F.

⁴ See Horton *et al.* (2011) for a description of how MTurk works.

number of choice tasks asking them to choose from different intertemporal payoff streams. We are not interested in intertemporal decision making per se, but the framework offers a straightforward way of implementing incentivised multi-attribute options, and it is one of the leading examples in Köszegi and Szeidl (2013). The dates for the payments were identical across the different options, but the amounts varied. The main idea of the design is to study how preferences over two target options depend on a third non-target option. The non-target options are designed to be unchosen but to make one of the two target options more attractive according to focusing or decoy. The prediction based on the focusing model is that a target option will be chosen more often if the range of its strongest attribute is increased by the non-target option. The decoy prediction is instead that if one of the target options (but not both) dominates the non-target option, then that target option is chosen more often.

The results from the first experiment reveal a significant focusing effect. Subjects are approximately 12% more likely to choose an option when the decision task is manipulated to increase the focusing of its strongest attribute. Moreover, the focusing effect is stronger than the decoy effect in our choice context. Our results are robust in controlling for socio-demographic variables, cognitive skills and personality traits.

To assess if the focusing effect varies with the decision-making context, we also perform a series of additional experiments. In these experiments we: (i) modify the mode by which the payments are presented, either using graphs as in the first experiment, or using numbers, and (ii) try to induce more or less deliberation by either forcing subjects to answer within 20 seconds or forcing them to wait for 20 seconds or letting them answer without any time restriction. In line with our first experiment, we observe a focusing effect. However, when we stimulate deliberation, by forcing subjects to wait before answering, or present options using numbers, the focus effects are smaller in magnitude and no longer statistically significant.

Our paper is related to a limited but growing body of literature that tests the behavioural implications of focusing. In line with much of the theoretical literature, the few existing empirical studies have honed in on a specific type of focusing effect referred to as the diminishing sensitivity phenomenon (i.e., the tendency for focusing to decrease when the value of an attribute is increased for all goods). Diminishing sensitivity is the central theme of Azar (2007) and Bordalo *et al.* (2012; 2013). The empirical literature on diminishing sensitivity is mixed but leans in favour of the hypothesis. In Azar (2011) the hypothesis is tested in a field experiment and a hypothetical study. Notably, while the hypothetical study supports the diminishing sensitivity hypothesis, the field results reject it. Yet, both Webb *et al.* (2015) and Dertwinkel-Kalt *et al.* (2017) find behaviour consistent with diminishing sensitivity in the lab.⁵

Even less attention has been given to studying the relationship between attribute differences and focusing, which is the issue we address. Dertwinkel-Kalt and Riener (2016) and Dertwinkel-Kalt *et al.* (2016) experimentally test for a bias towards concentration, which is one of the behavioural implications of assuming that attributes with larger differences receive more weight. Both papers find evidence of a bias towards concentration which is compatible with the existence of focusing effects.

One common feature in most of the existing empirical literature is that the choice data are used to test different implications of focusing but not the underlying assumptions directly. For example, Dertwinkel-Kalt and Riener (2016) and Dertwinkel-Kalt *et al.* (2016) use the implication that focusing leads to a preference towards concentration. In contrast, we offer a more direct test

⁵ Webb *et al.* (2015) also employ eye-tracking techniques, but the eye-tracking data are not consistent with focusing or salience driving their results.

of focusing. Both approaches have their merits, but one major drawback of using an indirect approach is the reliance on several auxiliary assumptions. For instance, a preference towards concentration may stem from other factors, such as subjects experiencing transaction costs of payments at different dates or having non-convex utility functions. We circumvent such issues by using an approach in which we manipulate the relevant features of the consideration set while holding the core choice options constant. Recently, and related to our work, Castillo (2020) finds a range effect in decision making under risk, which is compatible with the type of focusing considered here. In an experiment that uses a similar experimental strategy as we do, but only involving two attributes instead of three as we have, Bushong *et al.* (2021) report an opposite focusing effect to what we find in our paper. That is, subjects are more likely to choose an option that dominates in a dimension with a smaller range. To reconcile their results to the results reported here and elsewhere, they theoretically show that our result is more likely to occur with three or more attributes while their is more likely with two attributes.

Finally, our findings also relate to the earlier literature on context-dependent preferences (see, e.g., Kahneman and Tversky, 1979; Simonson and Tversky, 1992; Tversky and Simonson, 1993). In particular, this may offer a partial explanation of previously reported time-preference anomalies related to the framing of elicitation tasks (see, e.g., Loewenstein, 1988; Loewenstein and Thaler, 1989; Loewenstein and Prelec, 1992) and to the vast variability in estimated discount factors (Frederick *et al.*, 2002). Indeed, Köszegi and Szeidl (2013) use one of the model's implications to explain present-biased behaviour.

Our results from the additional experiments also indicate that stimulating deliberation and facilitating numerical calculations attenuate the focusing effect. Indeed, the former finding is in line with previous experiments showing that time pressure induces affective decision making that may increase the prevalence of decision biases such as the reflection effect (see Kirchler *et al.*, 2017; Persson *et al.*, 2018). The latter result may be explained by the fact that graphs emphasise information about relationships between options and attributes, thus potentially facilitating a focusing bias, whereas tables emphasise finding specific data values (Vessey, 1991). However, the evidence on the effects of presentation mode on decision making is mixed and, thus, likely to be sensitive to decision context (cf. Farmer *et al.*, 2017; Habib *et al.*, 2017).

This paper is organised as follows. Section 1 outlines the theoretical framework of Köszegi and Szeidl (2013) and states the research hypotheses. Section 2 presents the design and result of the first experiment and, in Section 3, we present the additional experiments. Finally, Section 4 concludes and suggests directions for future research.

1. Theoretical Framework and Hypotheses

We use Köszegi and Szeidl (2013) as a theoretical reference point and construct experiments that test the behavioural predictions of the model in a context of intertemporal choice. As their model is quite straightforward, we believe that it is instructive to begin by presenting the model before stating our research hypotheses and describing the experimental designs.

1.1. Theoretical Framework

As a basic building block, Köszegi and Szeidl (2013) assume that decision makers evaluate consumption options, c , from a, possibly restricted, set of options, C , referred to as the consideration

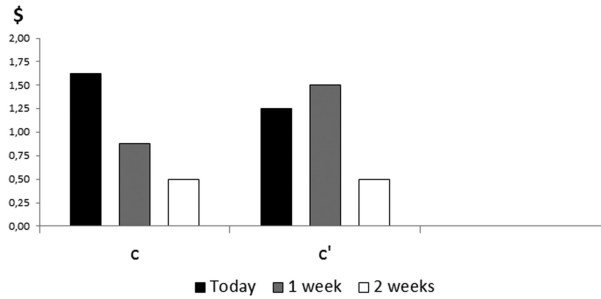


Fig. 1. *Decision Task.*

set. Note that c only contains the set of options that the decision maker actively evaluates, which may differ from the decision maker's entire set of possible options. That is, some options may be too inferior and are therefore excluded from the consideration set. However, how this restriction applies to a decision maker is left unspecified by the authors; in our experiment, we take c to be the entire choice set presented to the decision maker. A consumption option, $c \in C \subset \mathbb{R}^K$, is a K -dimensional vector (c_1, c_2, \dots, c_K) , where each dimension represents an attribute. The consumption utility is given by $U(c) = \sum_{k=1}^K u_k(c_k)$. However, when making decisions, the decision maker is affected by the specifics of the consideration set and, instead of maximising the consumption utility, the decision maker acts to maximise:

$$\tilde{U}(c, C) = \sum_{k=1}^K g_k \times u_k(c_k), \quad (1)$$

where $g_k = g(\Delta_k(C))$ is a strictly increasing function and $\Delta_k(C) \equiv \max_{c \in C} u_k(c_k) - \min_{c \in C} u_k(c_k)$. Given that g_k is a strictly increasing function by assumption, the basic prediction of this model is that consumers will attach more weight to attributes with large differences between the options. If instead $g_k(\cdot) = a$, $a \neq 0$, for every k , we are back to the standard model. If $g_k(\cdot)$ is strictly decreasing, we would obtain a model equivalent to that of Bushong *et al.* (2021); in that respect, our experimental design entails an indirect test of their model.

1.2. Hypotheses

In our experiments, a decision task consists of choosing one of various payoff streams over time. Figures 1 and 2 are decision tasks from the first experiment, which serve to illustrate our approach. The payoff streams have three attributes: payment today, payment in 1 week, and payment in 2 weeks. Note that we have no interest in eliciting time preferences; we choose the intertemporal setting because it offers an appealing way of incentivising a multi-attribute choice environment. If anything, our results show that elicitation of such preferences may be distorted by quite subtle differences in the consideration set.

To illustrate our experimental strategy consider Figure 1 in which the decision maker is asked to choose between payoff stream c' and c . We denote these options the target options and assume that c' is preferred over c . Our aim is to test the influence of manipulating the consideration set by introducing a new non-target option c'' on the likelihood of choosing c , while keeping

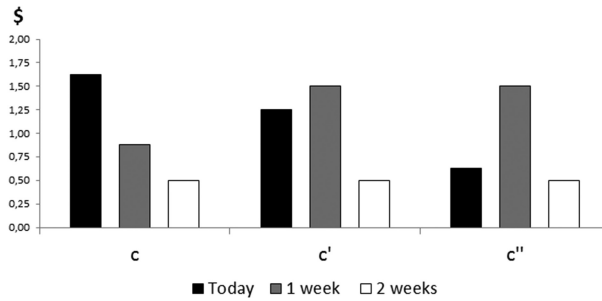


Fig. 2. *Decision Task Introducing c'' .*

both c' and c constant.⁶ Introducing an inferior non-target option may reverse the preference ordering over the original target options such that c becomes preferred to c' . Such preference reversals occur if the assumption of the theoretical model holds, i.e., $g'_k(\cdot) > 0$, and the non-target option sufficiently increases the maximal difference between options in the attribute dimension in which c dominates c' . In Figure 1, c dominates c' in the payment today attribute; thus, adding a non-target option that increases the maximal difference in the today attribute may cause some decision makers to choose c because attributes with a larger difference across options will be given more focus weight in the utility function $\tilde{U}(\cdot)$. Given that the target options c and c' remain constant, these preference reversals would thus stem from a change in the focus weight and not in the underlying consumption utility of the attributes, $u_k(\cdot)$. Figure 2 illustrates this scenario, as the introduction of c'' amplifies the maximal difference in the payment today attribute.

To test whether focus effects based on the size of the difference in attributes exist, we examine the fraction of times an option c is preferred to c' when c'' is constructed to manipulate the focus weights such that the subjects focus more on the option's strongest attribute. This leads to our first hypothesis:

HYPOTHESIS 1. *The likelihood that a subject prefers an option c over c' is increased if the non-target option, c'' , is chosen to increase the focus on an attribute dimension in which c dominates c' .*

The idea that adding irrelevant alternatives may affect decision making is also at the heart of the literature on the attraction/decoy effect (see, e.g., Huber *et al.*, 1982). The decoy effect implies that introducing an inferior non-target option, which is dominated in terms of attributes by one of the target options but not by the other, will increase the likelihood of the dominating target option being chosen. Some recent attempts to replicate the decoy effect have failed (Yang and Lynn, 2014; Huber *et al.*, 2014) and this may be caused by a conflict between focusing effects and the decoy effect. Figure 2 shows how focusing and the decoy effect can be incompatible. As discussed above, according to focusing, the introduction of c'' suggests that more decision makers should choose c . However, because c'' is dominated in all attribute dimensions by c' but not by c , c'' is also a decoy to option c' . Hence, focusing and the decoy effect generate opposite

⁶ To ensure that our results were not driven by the expansion of the consideration set, we also conducted a treatment in which the number of options was fixed (at three) in all decision tasks. We explain this treatment in greater detail in Online Appendix A. In the additional experiments presented in Section 3 we also fixed the number of options to three throughout the experiments.

Table 1. *Dollar Payments of the Options in Stage 1.*

Decision task	c			c'		
	Today	1 week	2 weeks	Today	1 week	2 weeks
1	1.625	0.875	0.5	1.25	1	0.5
2	1.625	0.875	0.5	1.25	1.125	0.5
3	1.625	0.875	0.5	1.25	1.25	0.5
4	1.625	0.875	0.5	1.25	1.375	0.5
5	1.625	0.875	0.5	1.25	1.5	0.5
6	1.625	0.875	0.5	1.25	1.625	0.5
7	1.625	0.875	0.5	1.25	1.75	0.5
8	1.625	0.875	0.5	1.25	1.875	0.5

Notes: The payments were rounded up to the nearest decimal when paid out.

predictions in decision tasks such as that presented in Figure 2. To test this conflict, we construct consideration sets in which decoy and focusing give different predictions, shedding light on focusing as a potential constraint on the decoy effect. This leads to our second hypothesis:

HYPOTHESIS 2. *The likelihood that a subject prefers an option c' over c is increased if the non-target option, c'' , is a decoy in the sense that it is dominated by c' but not by c in all attribute dimensions.*

2. The First Experiment

The core part of the first experiment consists of 16 decision tasks, evenly divided into two stages. The purpose of Stage 1 is to find target options c and c' between which a subject is close to indifferent. These options are then used to design the decision tasks in Stage 2 where a third non-target option c'' is introduced.⁷ If in Stage 1, we successfully find options c and c' between which the subject is close to indifferent, the focus manipulations in Stage 2 should be more likely to affect the subject's focus and thus the choices made.

We conduct two treatments in a between-subjects design; the main difference between the two treatments is that we have two options in Stage 1 of Treatment 1 and three options in Stage 1 of Treatment 2. Both treatments have three options in Stage 2. The main reason for the second treatment is to ensure that the expansion from two to three options (as in Treatment 1) between the two stages is not causing the differences in the fractions of choices of c and c' in Stage 2. Indeed, we do not find the outcome variables of interest to be significantly different between the two treatments, and we present results using the merged data from both treatments. In the interest of brevity, we present the design of Treatment 1. More details about Treatment 2 can be found in Online Appendix A, and the main results broken down by treatment are presented in Online Appendix E.

2.1. Stage 1

Stage 1 comprises eight decision tasks. In each decision task, the subjects are presented with two options, c and c' . Table 1 displays the dollar payments for the options in the eight decision

⁷ This first stage was merely implemented to increase the probability that focus and decoy effects would be generated in the second step. In the additional experiments, we drop the first stage.

Table 2. *Structure of Decision Tasks in Stage 2.*

Hypotheses	Decision task	Focus boosts	Decoy boosts	Based on Stage 1 decision task
Hypothesis 1	9	c'	–	Prior to SP
	10	c	–	SP
Hypothesis 1 and 2	11	c'	c	SP
	12	c	c'	SP
Control decision tasks	13	Control for task 9		Prior to SP
	14			SP
	15	Controls for tasks 10–12		SP
	16			SP

Notes: SP is short for switch point. In the case a of subject's SP being the first decision task in Stage 1, this decision task is used in all tasks in Stage 2.

tasks, and, as an example, Figure 1 shows how decision task 5 was presented to the subjects.⁸ To identify indifference, c is identical in all decision tasks while c' becomes more attractive with each decision task. This is achieved by gradually increasing the 1-week payment for c' . In this way, the setup of Stage 1 is reminiscent of the widely used multiple price list format, but each decision task is presented on a separate screen to maintain consistency with the presentation of decision tasks in Stage 2.

A subject is expected to choose c in early decision tasks and, at some point, switch to c' . The first decision task in Stage 1, where a subject chooses c' , is referred to as the subject's switch point (SP). To make the elicitation of the SPs less noisy, the order of the decision tasks and options is not randomised in Stage 1.

2.2. Stage 2

The decision tasks at the SP and just before the SP in Stage 1 are used to design the decision tasks in Stage 2, which are eight in total. Table 2 presents an overview of the tasks; the payoffs of the full set of decision tasks are described in Online Appendix G. In all decision tasks, a third non-target option, c'' , is added to c and c' . In decision tasks 9 and 10, c'' changes only the focus weights. The decoy effect is excluded by designing c'' with the highest payment in 2 weeks, which makes it undominated by c and c' . Thus, c'' is not a decoy to either c or c' in these decision tasks. Decision task 9 is constructed using c and c' from the decision task prior to the SP.⁹ Option c'' is chosen with a low payment in 1 week, thereby increasing the focus weight for this attribute. If a subject is affected by focus, this should make c' more attractive, as it has the largest payment due in 1 week. Decision task 10 is constructed using c and c' from the SP. This time, c'' is chosen to increase the focus weight for the payment today attribute. Therefore, c seems more attractive relative to c' .

In decision tasks 11 and 12, c'' changes both the focus weights and serves as a decoy to c or c' . In decision task 11 (12), c'' is designed as a decoy to c (c') and to increase the focus weight for the 1 week (today) attribute. Focus suggests that c' (c) becomes more attractive. According to the decoy effect, however, c (c') seems more attractive after the introduction of c'' . The focus

⁸ Figure 1 has been modified slightly to be suitable for black and white printing. The original format can be seen in the screenshots of Online Appendix H.

⁹ For subjects whose SP is the first decision task in Stage 1, there is no prior decision task. The options from the first decision task are instead used as a basis for designing all decision tasks in Stage 2.

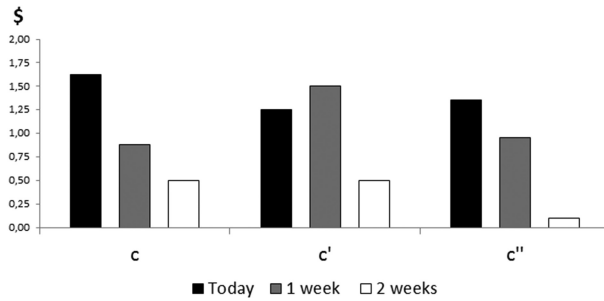


Fig. 3. *Control Decision Task.*

and the decoy effect thus offer opposite predictions in these decision tasks. Both decision tasks are created using c and c' from the SP.¹⁰

One obvious concern is that choices may be tainted by background noise. Differences in behaviour between Stage 1 and Stage 2 might thus be driven by noise rather than focus or decoy effects. To mitigate this issue, we will therefore compare choices in the manipulated tasks 9–12, with the choices in a set of non-manipulated control tasks. These control tasks—13 to 16 in Table 2—use the same c and c' as the manipulated tasks, but the non-target option, c'' , does not affect the maximal differences in the attributes or serve as a decoy. See Figure 3 for an example of a control task (which serves as a control task for the manipulated task displayed in Figure 2).

By comparing the fraction of choices of either c or c' between the manipulated tasks and the control tasks, we control for decision noise. Consequently, Hypothesis 1 can be tested using decision tasks 9–10 and their corresponding control tasks, while decision tasks 11–12 allow us to test Hypothesis 1 and Hypothesis 2 to see if any of the focus or decoy effects is stronger than the other. To balance the experiment, one control task uses c and c' from the decision task prior to the SP, and the three remaining tasks are designed using the options from the SP. In Stage 2, both the order of the decision tasks and the horizontal positioning of the options are randomised.

2.3. *Details of the First Experiment*

The experiment was conducted during November 2015 using the online labour market MTurk, and Qualtrics was used to implement the experiment.¹¹ Instructions and screenshots of the experiment are presented in Online Appendix H; in total, 602 subjects participated. The subjects were US citizens who had previously signed up for work on the MTurk platform.¹² The experiment consisted of an introduction, two control questions, the 16 decision tasks and a survey. The rules and procedures of the experiment were explained in the introduction. In the first control question, the subjects viewed a hand-written sentence, which they were asked to transcribe. The aim of this question was to control for computer bots. The second control question verified that the subjects

¹⁰ This is done in order to ensure one effect is not favoured over the other in each decision task. Because the subjects chose c' at the SP, focus is favoured in decision task 11, while the decoy effect is favoured in decision task 12.

¹¹ MTurk has previously been used for conducting economic experiments and has proved to replicate behaviour from traditional lab experiments successfully (see, e.g., Horton *et al.*, 2011; Suri and Watts, 2011; Amir and Rand, 2012; Dreber *et al.*, 2013; Beranek *et al.*, 2015; DellaVigna and Pope, 2017; 2018).

¹² Berinsky *et al.* (2012) showed that participants on MTurk are often more representative of the population than the usual convenience sample provided by recruiting university students.

had understood the decision tasks. In this question, subjects were presented with a decision task in which one option clearly dominated another option (see Online Appendix H for details).

Subjects had 20 seconds to complete each decision task. The time remaining in any decision task was shown in the upper-left corner of the screen. Subjects that spent more than 20 seconds were automatically redirected to the next decision task in the experiment. This rule was mainly introduced to keep subjects concentrated on the task and to make sure that the completion of the experiment was kept within a reasonable time limit. Very few participants finished outside this time frame and most chose an option well within the 20 seconds at their disposal. Our additional experiments presented in Section 3 also suggest that removing the time limit would have limited effects on behaviour. After completing the decision tasks, subjects provided background information such as age, years of college/university education, gender, etc. They also performed a test comparable to the commonly used cognitive reflection test (CRT) that consisted of answering the four questions proposed by Toplak *et al.* (2014). CRT scores have previously been shown to capture noise in decision making (Andersson *et al.*, 2016), and we also hypothesised that more cognitively able subjects would be less susceptible to a focusing bias. To further investigate what may moderate focusing bias, we also collected data on personality measures. In particular, we collected data on the subjects' degree of maximisation and satisficing behaviour (see Schwartz *et al.*, 2002) by letting subjects answer the three-dimensional version of the brief maximisation scale proposed by Nenkov *et al.* (2008). See Online Appendix H for a complete description of the questions in the survey.

One decision task was randomly drawn for payment at the end of the experiment. The three payments were then paid out at the announced dates. The payment today was transferred to the subject's account within 24 hours of completion. The payment of the decision task chosen for payment was conditional on the subject having completed this decision task within 20 seconds. Subjects received a fixed fee of US\$0.10 for participating in the experiment. To receive any payment, subjects had to enter a code into MTurk. This code was presented to the subjects once they had completed all of the steps in the experiment. Subjects spent on, average, 13 minutes completing the experiment and earned, on average, \$3.20. The average earnings per hour were \$14.75, which is far above the typical wage of MTurk workers.

2.4. Results of the First Experiment

In this section, we proceed by presenting evidence on how subjects react to the focus manipulations in Stage 2, using non-parametric tests and regression analyses. For the sake of presentation and space we present results from Stage 1 in Online Appendix B.¹³ We also present the relevant regression estimates graphically. Subsequently, we analyse the tension between focusing and decoy effects. We conclude with a discussion of our results.

As previously mentioned, 602 subjects logged onto the first experiment, and of these, 101 failed to answer our second control question and subsequently were dropped from the analysis, as we could not calibrate their decision tasks for Stage 2. This left us with 501 subjects who form

¹³ The first SP from Stage 1 forms a basis for the manipulations in Stage 2, where we attempt to affect choices by manipulating the focus. In sum, approximately 30% of subjects switch multiple times. Given that our Stage 2 tasks use the SP in Stage 1 as a base, our design needs to handle subjects with zero or multiple switches. In the former case, with zero switches, we simply use the last decision task as a base for all decision tasks in Stage 2. For those with multiple switches, we use the first switch (the SP), and the decision task prior to this task, to construct the Stage 2 tasks. We perform a robustness analysis in Online Appendix E, where we exclude subjects with multiple switches and show that the results are qualitatively similar, albeit somewhat weaker.

Table 3. *Decision Tasks and Frequencies of c Choices in Stage 2.*

Decision task	Focus boosts	Based on Stage 1 decision task	Fraction of focusing choices	Focusing choice
9	c'	Prior to SP	0.349	c'
10	c	SP	0.583	c
13	Control for task 9	Prior to SP	0.322	c'
14		SP	0.556	c
15	Controls for task 10	SP	0.509	c
16		SP	0.518	c

Notes: The last column shows the option that makes the variable focusing choice take value 1. SP is short for switch point. In the case in which a subject's SP is the first decision task in Stage 1, this decision task is used in all tasks of Stage 2.

our main sample.¹⁴ Also, throughout this section, we drop individual decision tasks in which the subject took more than 20 seconds to reach a decision; the reason for this is that they faced no financial incentives after 20 seconds. We drop 1.6% of the observations due to this restriction.¹⁵ Moreover, observations for which the subject chose the non-target option c'' are also dropped; 3.65% of the observations are dropped for this reason.¹⁶

2.4.1. *Focusing effects*

Our main findings on focusing effects can be summarised by comparing the fraction of 'focusing choices' between each of the manipulated decision tasks (9 and 10) and their respective controls. We let the variable focusing choice take value 1 in a manipulated task when a subject chooses the option that is boosted by focusing, and 0 otherwise. Hence, choosing option c' in decision task 9 is coded as a focusing choice, as is choosing option c in decision task 10. Because our experiment is designed to measure the focusing effect from differences in choices between manipulated and control decision tasks, the focusing choice also takes value 1 in a control decision task if the subject chooses the option that is boosted by focusing in its corresponding manipulated task, and 0 otherwise. Therefore, choosing option c' in decision task 13 and option c in decision tasks 14, 15 and 16 are coded as focusing choices. By comparing the differences in fraction of focusing choices between the manipulated tasks and their corresponding control decision tasks we can measure the focusing effect.¹⁷

In Table 3, we partly recapitulate the structure of the decision tasks previously displayed in Table 2 and show the fraction of focusing choices in the fourth column. On average c was chosen more often than c' . Moreover, the fraction of focusing choices is lower for tasks 9 and 13. This may be expected as c' , which if chosen is a focusing choice, pays less in these tasks as the decision task prior to the SP is used as a base when creating the tasks. Before we proceed to the analysis, it is important to recall that we are not interested in the level of focusing choices, but the difference in focusing choices between the manipulated and control tasks.

¹⁴ Table E.7 in the Online Appendix shows that including these subjects does not affect the main results presented in Table 4.

¹⁵ In Online Appendix E, we report regression results when retaining subjects who required more than 20 seconds to make a decision. The results reported in this section remain intact.

¹⁶ In Table E.1 of Online Appendix E, the number and fraction of missing observations split by decision task can be found.

¹⁷ Specifically, we take decision task 13 to form a control for decision task 9 and the average of decision tasks 14, 15 and 16 to form a control for decision task 10. When calculating the total effect for the control tasks, we take into account the fact that there is only one control task that is based on the task prior to the SP. We do this by giving equal weight to task 13 and the average of tasks 14, 15 and 16.

Table 4. *Focus: Marginal Effects from Probit Regressions with Focusing Choice as the Dependent Variable.*

	Model 1	Model 2	Model 3	Model 4	Model 5
Focus boost	0.0454*** [0.0158]	0.0453*** [0.0158]	0.0452*** [0.0159]	0.0454*** [0.0159]	0.0463*** [0.0160]
DT prior to SP	-0.214*** [0.0316]	-0.212*** [0.0318]	-0.213*** [0.0318]	-0.213*** [0.0319]	-0.215*** [0.0320]
CRT			-0.0189*** [0.00683]	-0.0185*** [0.00698]	-0.0180** [0.00762]
Decision time			0.000790 [0.00258]	0.00146 [0.00263]	0.00151 [0.00262]
SP				-0.00988** [0.00478]	-0.0110** [0.00473]
Multiple switch				0.0514** [0.0208]	0.0525** [0.0210]
Demographics					Yes
Decision-making style					Yes
Treatment 2		-0.00869 [0.0175]	-0.0105 [0.0176]	-0.0105 [0.0174]	-0.0120 [0.0175]
Constant	0.527*** [0.0177]	0.530*** [0.0198]	0.557*** [0.0279]	0.567*** [0.0352]	0.596*** [0.0609]
Observations	2,890	2,890	2,890	2,890	2,884
Clusters	496	496	496	496	495

Notes: Robust standard errors clustered at the individual level in brackets. Decision tasks 9–10 and 13–16 are used. Focus boost indicates whether an option in a decision task has been boosted by focus. SP refers to switch point. DT prior to SP indicates whether the decision task was designed using c and c' from the decision task prior to the SP. CRT is the subjects' score on a four-question cognitive reflection test. The variable 'decision time' measures the time from when the decision task is first displayed until a decision is made and the subject moves on to a new decision task. Multiple switch is a dummy variable indicating whether the subject switched from preferring c to c' more than once in Stage 1. Demographics is set of controls gender, age (continuous) and education (number of years in college/university education). Decision-making style captures three dimensions (decision difficulty, alternative search and high standards) relating to the subjects' degree of maximising and satisficing behaviour. Each dimension is captured by the average of the answers of two questions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

On average, subjects make around 10% more focusing choices in the manipulated tasks than in the control tasks. This positive 'focusing bias' indicates that subjects' behaviours are in line with Hypothesis 1. The size of the bias is, on average, approximately 5 percentage points (the size of the effect is roughly the same as in Dertwinkel-Kalt *et al.*, 2016). To determine whether the difference in fraction of focusing choices between the manipulated and control decision tasks is statistically different from zero, we perform a Wilcoxon matched-pairs signed-ranks test. We find that the focusing bias is statistically significant (p -value = 0.0025).

We also perform a regression analysis to determine whether the focusing bias is robust to controlling for the background variables that we collected. Table 4 presents the marginal effects from a series of probit regressions with focusing choice as the dependent variable.¹⁸ To capture the focusing effect, we include a dummy for the manipulated tasks in which an option is boosted by focus (focus boost). Because the level of focusing choices are lower when the decision task prior to the SP is used as a base for the decision task (DT), we also create a dummy to capture that effect (DT prior to SP). Standard errors are clustered at the individual level to capture serial correlation within subjects. In the simplest specification (Model 1), we find a significant focusing

¹⁸ In Table E.4 in Online Appendix E, we display the results from OLS regressions. The results are qualitatively similar.

effect that corresponds to a 4.54 percentage point increase in the propensity to make a focusing choice. Hence, the regression estimates corroborate the findings from the non-parametric test.

The coefficient estimates of the focus boost are very similar when we introduce further controls (Models 2–5). We note that subjects with higher scores on the cognitive reflection test (CRT) make fewer focusing choices across all tasks.¹⁹ We deliberately designed the Stage 2 decision tasks such that a focusing choice would be inconsistent with the option chosen in Stage 1. Therefore, this result indicates that subjects scoring higher on the CRT make Stage 2 choices that are more consistent with their Stage 1 choices. This is in line with recent findings on inconsistent choice and cognitive abilities in the context of risk preferences (Andersson *et al.*, 2016) and time preferences (Dohmen *et al.*, 2010; Benjamin *et al.*, 2013). Moreover, the measures of switching behaviour (SP and multiple switch) in Stage 1 are related to the number of focusing choices in Stage 2. The dummy variable for multiple switching is positively associated with making a focusing choice.²⁰ This might be due to the fact that we are less likely to capture a decision maker's true SP if they adopted several SPs. This may, in turn, lead to that such a subject makes more inconsistent choices with respect to Stage 1. Moreover, the SP coefficient is significant, indicating that the point of switching seems to matter for the level of focusing choices. This could make sense as the greater the SP, the better is c' in the decision tasks in Stage 2. If decision makers are noisy and switch too early in the list of Stage 1, then the variable SP captures this effect as subjects are more inconsistent. Yet, these relationships of switching behaviour should relate equally to the manipulations and control tasks and hence cannot drive our results on the effect of focusing. We also include socio-demographic controls (age, female and education) and a set of personality questions intended to capture the subjects' decision-making style.²¹ These controls add little additional explanatory power for our data.²²

We continue by investigating if there is an asymmetry with respect to boosting c and c' . An asymmetry may arise because boosting c or c' entails changing the focus weight on payment 'Today' or in '1 week', respectively. As the focus weights are assumed to be increasing in utility differences, this may give rise to different effects if these two attributes are valued differently in the utility function (e.g., because of discounting). To do this, we include separate dummies for focus on c and c' (focus boosts c and focus boosts c' , respectively). The marginal effects from probit regressions, with focusing choice as dependent variable, are presented in Table D.1 in the Online Appendix.²³ We visualise the marginal effects of interest from the most general specifications, including the same set of controls as in Table 4, in the second and third row of Figure 4. For the sake of comparison, we have included the marginal effect of focus boost from the most general specification in Table 4 in the top row of Figure 4. The second row displays a significant focusing effect when option c is boosted, which corresponds to a 6.4 percentage point increase in focusing choice. Although positive, the coefficient for focus boost c' is smaller and not statistically significant. We discuss these results in more detail in Subsection 2.4.3.

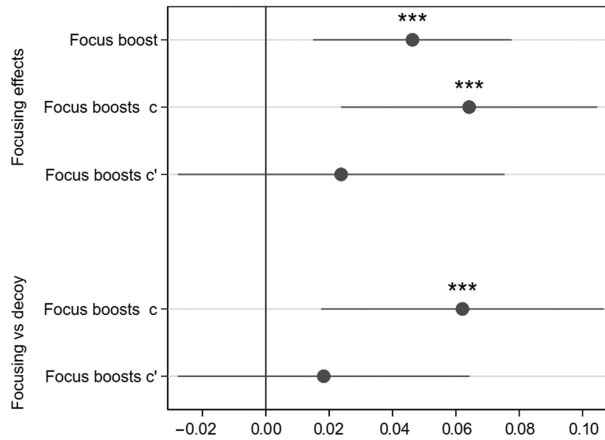
¹⁹ *Ex ante* we expected that subjects who make quick choices and who score low on the CRT are more likely to use decision heuristics and thus more likely to be affected by focusing (Frederick, 2005; Caplin and Martin, 2016; Noori, 2016). However, we do not find any such correlations.

²⁰ In Online Appendix E we also report regressions in which we excluded subjects with multiple switches.

²¹ We used the three-dimensional version of the brief maximisation scale proposed by Nenkov *et al.* (2008), which captures difficulty in making a decision, effort spent on searching for alternatives and the tendency to hold high standards.

²² In Table C.1 in the Online Appendix, we present summary statistics for all variables included in the regressions.

²³ The estimates of the control variables are very similar to the ones presented in Table 4.

Fig. 4. *Marginal Effects.*

Notes: The marginal effects of interest from the most general specification in Tables 4, D.1 and D.2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5. *Decision Tasks and Frequencies of c Choices in Stage 2.*

Decision task	Focus boosts	Decoy boosts	Based on Stage 1 decision task	Fraction of c choices	Choice in Stage 1
11	c'	c	SP	0.497	c'
12	c	c'	SP	0.575	c'
14			SP	0.556	c'
15	Controls for tasks	11 and 12	SP	0.509	c'
16			SP	0.518	c'

Notes: SP is short for switch point. In the case in which a subject's switch point is the first decision task in Stage 1, this decision task is used in all tasks of Stage 2.

2.4.2. *Focusing versus decoy*

We now turn to the issue of attempting to distinguish between focusing and decoy effects. As explained above, we introduced two decision tasks (11 and 12) to capture this. We will use the fraction of c choices as the outcome variable for this analysis.²⁴ Table 5 shows the fraction of c choices by each decision task used in the subsequent analysis.

The fraction of c choices is approximately 5 percentage points greater when focus boosts c than for the control decision tasks and 2 percentage point smaller relative to the control decision tasks when focus boosts c' . Because the fraction of c choices are higher when we boost option c with focus and lower when we boost option c' compared to the control tasks, we find evidence that the focusing effect is stronger than the decoy effect.²⁵ As before, we use Wilcoxon matched-pairs

²⁴ This is due to both manipulated decision tasks, 11 and 12, were constructed using c and c' from the SP. Therefore, we use the same control decision tasks, 14, 15 and 16, for both manipulated tasks. Note from Table 5 that while choosing c' is a focusing choice in decision task 11, choosing c is a focusing choice in 12. This makes the outcome variable focusing choice infeasible as choices of different options are coded as a focusing choice for decision tasks 11 and 12, while at the same time we would need one of the options (either c or c') to be coded as a focusing choice in the three control decision tasks.

²⁵ Trueblood *et al.* (2013) conducted a study on context effects using a decision-quality task asking subjects to assess which of three rectangles has the bigger area. They find the decoy effect is stronger when contrasted to focusing (they refer to it as range decoy). However, their setting is about perception and decision-making quality which is fairly different from ours.

signed-ranks tests and find that the focus effect is significant when focus boosts c (p -value = 0.036) but not when focus makes c' more attractive (p -value = 0.781).²⁶ Taken together, we do not find support for Hypothesis 2.

We also run probit regressions using the same battery of controls as in Subsection 2.4.1, with marginal effects presented in Table D.2 in the Online Appendix. The bottom two rows of Figure 4 display the marginal effects of interest from the most general specification.²⁷ The results show a significant and robust effect of focusing on c but not on c' . In their model, Köszegi and Szeidl (2013) assume that ‘clearly dominated options’ should be excluded from the consideration set and hence not be included when forming focus weights. Whether asymmetrically dominated choices, as introduced here by the decoy option, should be included in the consideration set, is unclear. Yet, in our experimental data, these asymmetrically dominated options seem to matter for decision making and are therefore clearly in the consideration set, at least for some of the subjects.

2.4.3. Discussion of results

Our results suggest that larger differences in attributes attract attention and influence subjects’ choices, as proposed by Köszegi and Szeidl (2013). Whereas Bushong *et al.* (2021) make the opposing assumption that focusing decreases with the size of the difference in attributes, our results also show that their assumption fails to hold, at least in the context of the current experiment. Furthermore, hyperbolic discounting or self-control problems cannot explain our results because the trade-off between options c and c' should not depend on payoffs of the unchosen non-target option c'' .

We also report that the focus effect is stronger when the focus is on the large immediate payment of option c . One possible explanation is that subjects do not perceive payments at the three dates as the relevant attributes. For example, if a subject in our setting treats the sum of payments at future dates as one attribute, then our manipulation is weaker and could, in some cases, even be reversed. This could explain why we do not find an effect of focus when boosting option c' . We share this issue with most other empirical tests of multi-attribute choice models, and it would require a new experimental design to investigate this further.

An alternative model of context-dependent preferences is salience theory, developed by Bordalo *et al.* (2013), and we can apply it to our setting to see whether it can explain the data. Salience theory is similar to the model proposed by Köszegi and Szeidl (2013), but it assumes a different ‘salience function’ to determine the focus (or salience) weights. Applying the salience function discussed in Bordalo *et al.* (2013) to our decision tasks, we can obtain a rough estimate of how well salience theory can predict choices (a more detailed presentation of salience theory and its predictions in our experiment can be found in Online Appendix F). Comparing salience between the manipulated tasks and their control tasks, salience theory boosts the same option as focus in 51.1% of the cases, and in the complementary set of cases the predictions diverge. Using the fact that there is not a complete overlap, we can test whether salience theory can explain our data. We run probit regressions on all decision tasks from Stage 2 using c choice as the dependent variable. The results are shown in Table F.11 in the Online Appendix. The results suggest that salience has low explanatory power in our setting because the two estimates of the salience variables are insignificant. It should be noted that the experiment was not designed to test salience theory

²⁶ See Table E.3 in Online Appendix E for a breakdown by treatment.

²⁷ Because the control tasks for decision tasks 11 and 12 are the same, we cannot generate an aggregate effect corresponding to the one at the top row of Figure 4.

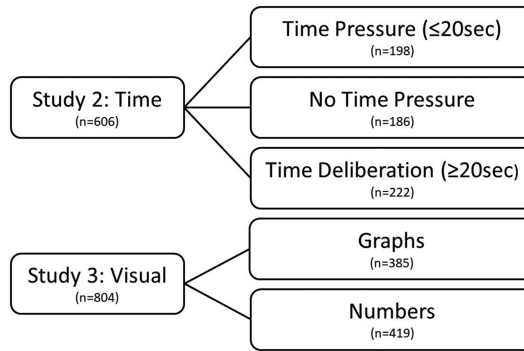


Fig. 5. *Treatments in Study 2 and 3.*

and that the salience predictions depend on additional assumptions on the functional form of the salience function. Hence, to obtain more conclusive insights, future research should employ a design explicitly constructed to test salience theory.

3. Additional Experiments: The Role of Time Pressure and Visualisation

In the section above, we observed a significant focusing effect in intertemporal decision making. The purpose of this section is to investigate to what extent the results are affected by changing important aspects of the experimental design that, in turn, may shed light on the decision process behind the results. We present data from two pre-registered experiments in which we: (i) remove and modify the time pressure and (ii) vary the visual interface, showing graphs or plain numbers.²⁸ This allows us to investigate how the focusing effect varies with the degree of deliberation and mode of presentation.

We use a slightly updated between-subject design that differs from the first experiment in a few aspects. First, we drop Stage 1, where we searched for subjects' switch points and instead let subjects proceed directly to the equivalent of Stage 2 where focusing is tested. To create variation in the decision tasks and introduce focusing effects, the set of decision tasks will be slightly different from the first experiment (and more akin to a combination of Stage 1 and 2). Second, we now drop the control decision tasks (i.e., decisions 13–16 in Table 2) and directly compare decision tasks where focusing boosts c to tasks where c' is boosted. Third, instead of letting subjects choose their preferred option, we now let them rank all three and then analyse if their ranking of c and c' is affected by c'' . The two former updates make the experiment faster to conduct and more straightforward to analyse because all participants faced identical decision tasks. The third update enables us to keep more observations as we always observe the preference order of c and c' . It also makes it possible to include more attractive c'' options, without dropping subjects that ranked c'' first. Finally, the future payments of the options are made in one and two months instead of weeks.

Observations were collected in two separate studies (denoted Time and Visual). The treatments were implemented using between-subject variation in time pressure and visualisation. Figure 5 shows the treatments of the two studies. In the Time study we conducted three treatments where

²⁸ Pre-registered at OSF <https://osf.io/ny95t> and <https://osf.io/juc73>.

the first kept the same time restriction as our first experiment (subjects had to answer within 20 seconds), the second put no time restriction on the subjects, and the third forced subjects to wait 20 seconds before taking a decision. In the Visual study, we conducted two treatments where the first treatment used the same visual interface as in the first experiment, and the second replaced the bar graphs by numbers.²⁹ Screenshots of the treatments are presented in Online Appendix H.

In any treatment of the two studies, subjects were asked to complete eight decision tasks. The decision tasks were designed with the same set of options in all treatments and divided into four pairs, as displayed in Table 6. In each pair, c and c' are held constant. Option c'' is designed to increase the maximal difference in the today attribute of one of the tasks in each pair (tasks 1a to 4a) and to increase the maximal difference in the 1-month attribute in the remaining task (tasks 1b to 4b). Option c always dominates c' in the today attribute while c' always dominates c in the 1-month attribute. Therefore, following Hypothesis 1, we predict that increasing the maximal difference in the today attribute will increase the share of subjects ranking c lower than c' (focus boost c) compared to the situation when the maximal difference in the 1-month attribute is increased (focus boost c'). By comparing rankings of c and c' in each pair, we can study if there is a focus effect. Although the order in which the decision tasks appear is randomised, the combinations of c and c' are designed similar to a multiple price list: c' becomes more attractive relative to c as we move down ‘the list’ of pairs. This is achieved by decreasing the today payment of c and increasing the 1-month payment of c' .

As in the first experiment, one decision task was randomly chosen for payment. To incentivise the rankings of the subjects, a lottery with two-third probability assigned to the subject’s most preferred option and one-third probability assigned to the second most preferred option was used to determine the option which was to be paid out. The payments were transferred to the subjects on the promised dates conditional on finishing the experiment.³⁰ The two experiments were conducted during autumn 2019 and spring 2020 using the online labour market MTurk. Qualtrics was used to implement the experiments, thus making the procedures identical to the first experiment. Subjects received an average payment of US\$4.80 and they spent, on average, 14.5 minutes completing the experiment. The average earnings per hour were thus roughly \$20, which is far above the typical wage of MTurk workers.

3.1. Results

We start this section by giving a brief overview of the data, followed by the main analysis of the focusing effect. In the Time study, 691 subjects enrolled, 87.7% passed the control questions, and those that failed are excluded from our analysis. Of the 904 subjects who enrolled in the Visual study, 88.9% passed the control questions and those that failed are excluded from our analysis. The remaining subjects were randomly assigned to the treatments, as shown in Figure 5.

In our analysis, we are interested in the subjects’ relative preferences of the two options c and c' . Consequently, we will investigate whether the relative ranking of c and c' can be affected by focusing and if this effect is, in turn, dependent on the treatment. For that reason, we measure the instances in which a subject prefers c to c' by letting cRc' be a variable that takes the value one if a subject reports that they prefer c to c' and zero otherwise. We estimate a series of probit regression models with cRc' as the dependent variable for both the Time and Visual studies. For

²⁹ There was no time restriction in the Visual study.

³⁰ We also employed the same *ex post* questionnaire as in the first study, collecting information on socio-demographics, cognitive reflection and decision style. See Online Appendix H for details.

Table 6. Dollar Payments in the Eight Decision Tasks for Study 2 and Study 3.

Task	Focus boost c								Focus boost c'								
	c		c'		c''		Task		c		c'		c''		Task		
	1m	2m	T	1m	2m	T	1m	2m	1m	2m	T	1m	2m	T	1m	2m	T
Pair 1	1.7	0.8	2	2	0.8	0.7	2	1.6	1b	1.7	0.8	2	2	0.8	2.5	0.2	2.5
Pair 2	1.7	0.8	2	2.1	0.8	0.6	2.1	1.6	2b	1.7	0.8	2	2.1	0.8	2.4	0.3	2.4
Pair 3	1.7	0.8	2	2.2	0.8	0.5	2.2	1.6	3b	1.7	0.8	2	2.2	0.8	2.3	0.4	2.3
Pair 4	1.7	0.8	2	2.3	0.8	0.4	2.3	1.6	4b	1.7	0.8	2	2.3	0.8	2.2	0.5	2.2

Notes: T, 1m and 2m denote the payment today, in 1 month and in 2 months, respectively.

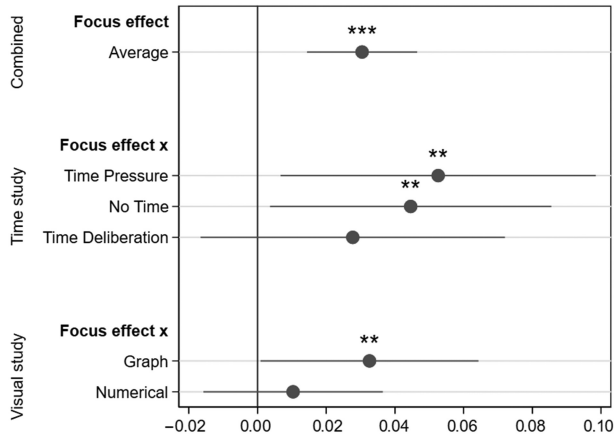


Fig. 6. Marginal Effects of Focusing.

Notes: The marginal effects of interest from the most general specifications in Tables D.3, D.4 and D.5 in the Online Appendix. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

the sake of space, the marginal effects estimates of these regressions are presented in Tables D.3, D.4 and D.5 in the Online Appendix. In Figure 6, we visualise the marginal effects of the relevant interaction terms, and the average focus effect, from the most general specifications including the full set of controls presented in Tables C.2 and C.3 in the Online Appendix as well as a set of decision-pair fixed effects.³¹

As indicated by the estimate presented at the top row, there is a positive and statistically significant focus effect when using data from all treatments. Regarding the time pressure manipulations, we find that there is a significant and positive effect of focusing in all but the time deliberation treatment. This shows that the time constraint is not pivotal to the existence of a focusing effect. The coefficient is smaller and insignificant in the time deliberation treatment. One mechanism that may explain this result is that the forced time for deliberation makes subjects more prone to add up the dollar value of the options, rather than assessing the options using a more intuitive decision-making process or heuristic.³² In line with this argument, we find that it is significantly more common to rank options according to their dollar value in the time deliberation treatment compared to the time pressure treatment.³³

Turning to the Visual study, we find that presenting the options using graphs produces a significant focusing effect while switching to using numbers reduces the focusing effect, making it insignificant. Also, in this case, we believe that dollar value maximisation is a plausible mechanism that is induced by presenting options using numbers. The data shows that subjects rank the options according to their total value significantly more often in the numerical treatment compared to the graph treatment.³⁴ As the attributes (\$ at different points in time) are fairly

³¹ Pairwise F -tests of equality of estimated coefficients find no statistically significant differences between any two of the three interaction variables; $Focus\ effect \times Time\ pressure$, $Focus\ effect \times Time\ deliberation$ and $Focus\ effect \times No\ time$ in model 4 of Table D.3..

³² In the pre-analysis plan, for the time study, we also specified that we would investigate the interaction between focusing and the subjects' score on the CRT. We have performed this analysis, but did not detect any meaningful interaction effects. To save space, we have decided to leave it out of the presentation.

³³ See Table D.6 in the Online Appendix.

³⁴ See Table D.7 in the Online Appendix.

easy to aggregate into a single attribute, presenting options using numbers may nudge people to simply maximise the sum of payments, and hence not view them as separate attributes. Even if subjects are affected by focusing, but consider the sum of payments as the only relevant attribute, then we would expect to find no focusing effect between pairs of decision tasks because options c and c' are identical in each pair. Consequently, it is pivotal for the model's predictions in our experiments that subjects consider different payments in time as separate attributes.

One potential concern is that choices in the graphical treatment are due to confusion or about subjects not being able to read the numbers on the y-axis of the graph. However, it should also be noted that making it somewhat complicated to read the graphs was partially intentional. We did not want subjects to simply aggregate earnings over the three dates and then pick the option yielding the highest total payment. This is not the kind of decision-making situation we wanted to test because treating the attributes separately is pivotal for the model's predictions. We also believe that the graphical interface is representative of many situations outside of the lab, where the metrics of the attributes are sometimes not straightforward to obtain and compare using a single metric. But clearly, the results of the numerical treatment show that the power of focusing is not unbounded. Like many other aspects of behavioural decision making, it depends on the context.

4. Conclusion

A long-standing consideration in the literature on multi-attribute choice is that the attractiveness of an option is related to how much that option stands out compared to the alternatives. One line of research postulates that adding an inferior option causes the dominant option to become more attractive (Huber *et al.*, 1982). Others have suggested that attractiveness is determined by the decision maker's focus and, in particular, that a decision maker focuses disproportionately on certain attributes that stand out (Bordalo *et al.*, 2013; Köszegi and Szeidl, 2013). The key assumption of the model of focusing by Köszegi and Szeidl (2013) is that focus is increasing in the size of the difference in attributes among the options under consideration. We report evidence from several experiments specifically designed to test this assumption. We find that introducing a new option that increases the maximal difference in an attribute affects behaviour. In general, we find that subjects are more likely to choose an option when the maximal difference in the option's strongest attribute dimension is increased. However, our experiments also show that the strength of the effect depends on the specifics of the choice situation. In particular, the focusing effect appears to fade when the setting favours expected value maximisation through forced reflection or by simplifying numeric calculations.

Our findings show that focusing affects decision making, which introduces the possibility of distorting choices by shifting the focus of the decision maker. For instance, a societal planner could have a beneficial impact by softly and non-intrusively influencing individual perceptions regarding the alignment of individual and societal goods. These policies would influence those most receptive without depriving the freedom of those not prone to mistakes. To design effective interventions based on focusing, it is important to gain additional knowledge about which choice contexts and personality types are prone to focusing.

Future research needs to explore further how our results relate to the complexity of the choice tasks. One interesting issue in this direction would be to study how focus interacts with the number of attributes. It also seems interesting to address the effects of focusing in strategic settings. In this vein, Avoyan and Schotter (2020) find that, when subjects play several games at

the same time, the amount of attention (measured in time) that they devote to a specific game depends on the characteristics of the other games that they are playing. Another avenue for future research is to assess focusing using eye-tracking methods. Finally, when comparing models of focusing (Kőszegi and Szeidl, 2013) to models of salience (Bordalo *et al.*, 2013), we find that the former does a better job in explaining our data. Yet, our experiment was designed to test for the existence of focusing effects and was, thus, not designed to distinguish between these two theories. Consequently, these results should be interpreted with caution until further research has been conducted on this topic.

Uppsala University, Sweden & Research Institute of Industrial Economics, Sweden

Uppsala University, Sweden

Lund University, Sweden & Hanken School of Economics, Finland

Additional Supporting Information may be found in the online version of this article:

Online Appendix Replication Package

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