Visual continuous time preferences: field experiment in Honduras*

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Abstract

Visual Continuous Time Preferences (VCTP) is a new tool for measuring time preferences that synthesizes the simplicity of Multiple Price List (MPL) and the precision of Convex Time Budget (CTB) tasks. We evaluate this tool in the field, in rural Honduras, to test whether running the task with enumerators and reducing the number of balls to five improves the quality of results. We partially replicate results of the laboratory experiment since subjects answer the task rapidly and consistently to reveal their time preferences, but they make little use of the additional precision. Enumerators are crucial for maintaining sample size and reducing

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the number of balls is not an improvement because it decreases the precision of answers. Results therefore suggest the power of the visual methodology to measure economic preferences with populations struggling with complexity by making accessible the salient aspects of the reasoning.

Keywords: Time Preference; MPL; CTB; Visual Experiment; Field Experiment.

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1 Introduction

Humans commonly make decisions implicating inter-temporal outcomes. From daily consumption and savings to buying a house or raising a family, time preferences are at the core of decision-making, with the recent study by Falk et al. (2018) showing substantial heterogeneity in time preferences and a direct impact on important life outcomes. Understanding their formation and estimating them is therefore of great importance for economists and policymakers. The economic literature links patience to better decision-making with several papers. It shows that patient individuals have better educational outcomes (Duckworth & Seligman, 2005; Kirby et al., 2005; Golsteyn et al., 2014; Non & Tempelaar, 2016; Angerer et al., 2023) and make better financial decisions (Ashraf et al., 2006; Tanaka et al., 2010; Meier & Sprenger, 2010, 2013; Epper et al., 2020), while impatient individuals make worse health decisions (Kirby et al., 1999; Borghans & Golsteyn, 2006; Chabris et al., 2008; Sutter et al., 2013). The literature also suggests that patience is a domain-general characteristic by showing that it correlates with higher cognitive abilities (Frederick, 2005; Burks et al., 2009; Dohmen et al., 2010; Bosch-Domènech et al., 2014), that impatience levels are similar between primary and monetary rewards (Reuben et al., 2010; McClure et al., 2004, 2007), and that time preferences are stable over time (Meier & Sprenger, 2015). Recent investigations on the formation of these preferences and how they are shaped throughout the life cycle identified genetic variations (Zyphur et al., 2009; Cesarini et al., 2009), cultural transmission from parents to offspring (Bisin & Verdier, 2000; Samek et al., 2021; Stoklosa et al., 2018; Brañas-Garza et al. (2023), and maturation during the scholastic phase of childhood and adolescence at school (Brocas & Carrillo, 2020a; Brocas & Carrillo, 2020b; Brocas & Carrillo, 2022; Sutter et al., 2018). Intervention in schools demonstrated that these preferences are malleable during adolescence,

with financial education increasing financial knowledge, savings, and time consistency in teenagers (Bruhn et al., 2013; Lührmann et al., 2018; Alan et al., 2018; Sutter et al., 2023). Two of these papers also found that results were maintained in the field several years later. We, therefore, conclude that a tool able to rapidly and precisely measure time preferences with all types of populations is desirable for the literature.

This paper is a continuation of Prissé (2023) introducing the Visual Continuous Time Preferences (VCTP) task. The VCTP measures time preferences by synthesizing the qualities of the two methods used in the literature: the Multiple Price List (MPL) of Coller and Williams (1999) and the Convex Time Budget (CTB) of Andreoni and Sprenger (2012). From MPL, it takes the small amount of time and high consistency of the task. From CTB, it takes the precision in measurement of the task. It does so by addressing the same limitation in both tasks: a focus on the logical evaluation of numerical monetary amounts while neglecting the visual aspect of decision-making, whereas the human experience is dominated by the sense of sight. The contribution of VCTP is therefore to introduce *visualization* in the experimental design and demonstrate its potential to measure meaningful economic preferences as well as combining together the strong points of different mechanisms.

The VCTP task measures time preferences by giving ten coins to subjects and asking them to answer six scenarios in which they choose how much coins they want to allocate at the early period for 1 Euro and how much coins they want to allocate at the later period for 1 Euro plus an interest rate for waiting. The early period corresponds to a delay of 1 day (to avoid present bias) and the later period corresponds to a delay of 8 days. The six scenarios propose to subjects

progressively increasing interest rates of 0%, 20%, 40%, 60%, 80% and 100%, which respectively corresponds to 10, 12, 14, 16, 18 and 20 Euros if the subject choose to allocate all his coins in the later period. Subjects choose for each coin separately thanks to the introduction of visualization inside the experimental design: the amount in the early period is represented by 10 solid circles each corresponding to 1 Euro. The amount in the later period is represented by 10 dotted circles around the solid circles with a diameter proportional to the interest rate from waiting. A dotted cross inside each dotted circle allows subjects to indicate their choice by coloring the cross in blue if they want the money in the early period and in red if they want the money in the later period.

The VCTP is probably best described and understood as an MPL within the MPL. Choosing between 10 Euros in the early period and the maximum amounts of 10, 12, 14, 16, 18, and 20 Euros in the later period constitutes the first layer of MPL, which corresponds to the original MPL mechanism. Choosing how to allocate each coin differently between the early and late periods in each decision forms the second layer of MPL, which resembles an implicit 11-choices MPL. This mechanism is similar to the iterative MPL of Andersen et al. (2006), except that visualization enables the iterative MPL to be seamlessly applied across all periods, allowing us to study how subjects' preferences change from the early to the late period. Therefore, it is probably more appropriate to describe the mechanism of the second layer as a combination of the CTB mechanism and visualization, as tokens from the CTB mechanism are now visually represented to subjects. Although it comes at the cost of reducing the number of tokens and, therefore, precision, it makes realistic sense because humans simplify monetary calculations by minimizing the amount of physical money they need to manipulate with coins of different sizes and colors.

Results from the laboratory experiment indicated that subjects completed the task rapidly in 400.98 seconds (6.68 minutes) with a high consistency of 90.07%. The task precisely identifies the time preferences of subjects because they make meaningful use of the additional precision provided by the opportunity to differentially allocate between early and late periods. These results called for further investigations of the usefulness of the *visualization* method. Indeed, lab subjects were students of the University of Sevilla and therefore Western European with favorable socioeconomic conditions. They were therefore an ideal pool of subjects. However, the interest of visualization is to provide an intuitive language that can be understood by any human being. We were therefore interested to validate VCTP with a pool of subjects that would be the opposite of the previous one, meaning subjects with low economic status and little access to intellectual resources during their life, in order to validate the universality of VCTP through visualization.

VCTP is not the first task using visualization in the economic literature. The field literature already used visual tools to address the complexity of the CTB task and make it more accessible to their subjects. Aycinena & Rentschler (2018) replaced the mechanism of allocating tokens to obtain precise monetary payoffs by asking subjects to choose between proposed monetary amounts illustrated with local coins and banknotes. Giné et al. (2018) replaced the mechanism of allocating tokens by instructing subjects to allocate beans into two bowls, with one bowl representing the early period and the other representing the later period. Balakrishnan et al. (2020) asked subjects to indicate their choice by moving the cursor of a slider on a touchscreen interface. The slider bar also uses a color gradient to symbolize the proportion of money allocated to each

period. All of these previous papers essentially used visual shortcuts to reduce the cognitive load on subjects. The first paper to use a fully visual design was Angerer et al. (2015) to adapt MPL and CTB to children. In MPL, interest rates were represented by colors and payoffs with coins. In CTB, subjects were physically given five tokens and asked to draw them inside boxes representing present and future periods. Both measures were able to elicit similar results, suggesting the methodological pertinence of visual experiment with children and calling for testing its validity with adult populations.

Between Prissé (2023) validation of visual experiments with lab subjects and Angerer et al. (2015) validation of visual experiments with children, there was a gap in the literature regarding the validation of visual experiments with a population exhibiting characteristics between these two groups. The purpose of this paper is to precisely address this gap by validating the VCTP task in the field. We achieve this by creating a new version of the VCTP task that helps subjects understand the concept of interest rates using piggybanks. Additionally, we test whether providing subjects with enumerators or simplifying the task design with 5-coins can improve the quality of results. We partially replicate the results of the lab experiments, as subjects require more time to answer, exhibit less consistency, and make limited use of the additional precision. Furthermore, simplifying the task to 5-coins results in a loss of precision, while providing subjects with enumerators improves the quality of results. We interpret these findings as suggesting that visual experiments may require further adaptations to be effective with more challenging populations, but they still hold promise.

The rest of the paper is organized as follows: Section 2 presents the experimental design, outlines the questions to be addressed, describes the measurements

of interest, and explains the implementation of the experiment. Section 3 outlines the econometric approach used to analyze the data. Section 4 examines the reasons for attrition and assesses whether the sample is balanced between conditions. Section 5 presents the results of the experiment. Finally, Section 6 provides the conclusion.

2 Experimental Design and Procedures

We use the experimental design of Prissé (2023) that was described in the previous section and that is illustrated by Figure **??** in Appendix for an interest rate of 60%. We adapted the task to the context of rural inhabitants of developing countries who are likely to have difficulties understanding the mechanism. We therefore facilitated the understanding of the task for these subjects by replacing the indication of the interest rate with a direct display of the maximum amounts of money in both the early and late periods. We also replace the indication of the value of each coin in the early and late periods with a clear and concise sentence that conveys the same information to subjects. Finally, we removed the dotted circles that previously indicated the additional amount of money associated with the interest rate in the future and replaced them with piggy banks filled up to the value of the interest rate. The solid circles with dotted crosses are the only part of the task that is identical to the original one. Figure 1 displays the experimental task for a 60% interest rate and Figure 2 displays the piggybanks associated with each interest rate.

Similarly as the original paper, we were interested in comparing the MPL mechanism adapted to our experimental design with the CTB mechanism adapted to our experimental design and that corresponds to the VCTP task. Subjects, therefore, answered both the MPL and the VCTP tasks, with half of the sub-

jects answering the MPL first and half of the subjects answering the VCTP first. We remind that subjects are allowed to allocate coins in the early and late periods in each task according to the following rules:

- MPL: subjects are forced to allocate all the coins either to the present or to the future.
- VCTP: subjects are allowed to allocate each coin to the present or to the future.

It therefore means that the difference between each treatment is *allowing subjects to make interior solutions*. The MPL treatment allows us to investigate the robustness of the task to populations of developing countries, who may require more time to respond and exhibit less consistency. The VCTP treatment allows us to investigate whether subjects use the additional precision of interior solutions, an aspect we anticipate to be less prominent among these subjects and that could lead to lower consistency.

We take opportunity of being in the field to answer two additional questions. The first is whether simplifying the experimental design with five coins is an improvement, since it should decrease the response time but could also decrease the quality of results by diminishing precision. We therefore have half of subjects answering the 5-coins version of the task and half of subjects answering the 10-coins version of the task. The only difference between the two conditions is that the 5-coins version of the task display the coins in a single horizontal line. Figure **??** in Appendix displays an example of experimental design for the five coins task with 60% interest rate. We therefore have two treatments related to the number of coins:

- 5-coin: subjects answer the 5 coins version of the task.

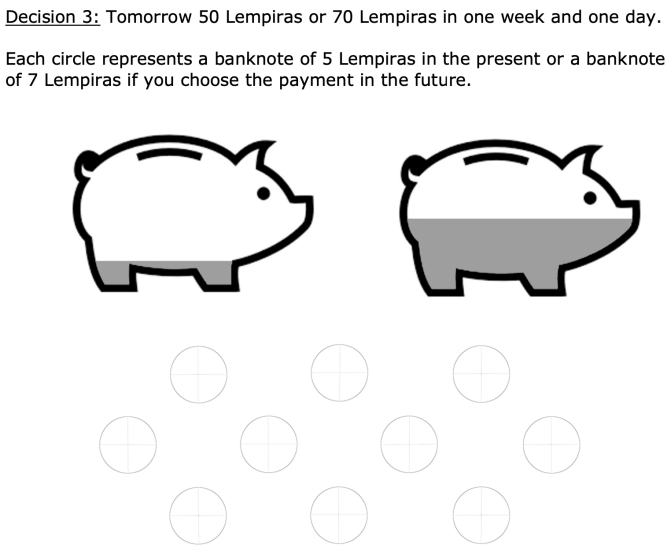

Figure 1: Example of experimental design for 60% interest rate

- 10-coin: subjects answer the 10 coins version of the task.

The second question we aim to answer is whether helping subjects with enumerators influence the answers of subjects. Indeed, enumerators are widely used in the field and might bias the results by changing the preferences of subjects. It also allows us to investigate whether the universal language of visualization allows subjects to answer the task in autonomy because time and consistency are sufficiently satisfying without the help of enumerators. Subjects therefore answer the experiment according to two different mode of administration:

- Self-Administered: subjects answer the experiment without the help of an enumerator.
- Externally-Administered: subjects answer the experiment with the help of an enumerator.

We therefore have a 2x2x2 design resulting in the following 8 experimental conditions in our study:

Figure 2: Piggy bank visualization by increasing interest rate

- (i) MPL - 5-coin - Self-Administered.
- (ii) MPL - 5-coin - Externally-Administered.
- (iii) MPL - 10-coin - Self-Administered.
- (iv) MPL - 10-coin - Externally-Administered.
- (v) VCTP - 5-coin - Self-Administered.
- (vi) VCTP - 5-coin - Externally-Administered.
- (vii) VCTP - 10-coin - Self-Administered.
- (viii) VCTP - 10-coin - Externally-Administered.

We use the same four basic measurements than the original study to measure the effect of how subjects are allowed to allocate coins to the future, the number of coins and the administration mode:

(i) *Time* (*Time*) is the number of seconds subjects take to complete the task. It is defined as the time interval between starting to answer the first scenario and completing the last one. It therefore includes both the time needed to reflect on the answer and the time needed to indicate the answer.

(ii) *Consistency* (*Cons*) identifies subjects who correctly perform the task. Subjects are consistent if their number of future choices always remains the same or increases when the interest rate increases. This criterion is harder to satisfy in

VCTP because allocating X coins in the future at one interest rate means that you should also allocate at least these X coins in the future when their value increases.

(iii) *Allocations to the future* ($NumFut$) refers to the total number of coins allocated to the future in all decision tasks. Subjects indicate their budget choices by allocating X coins to the future, with $X \in \{0, 10\}$ in MPL and $X \in \{0, 1, 2, ..., 10\}$ in VCTP. We doubled the allocations of subjects answering the 5-coin version of the task to make results more easily interpretable.

(iv) *Number of allocations to interior solutions* ($NumInt$) refers to the total number of coins allocated to the future by using interior solutions of VCTP, that is, the sum of allocations in which $X \in \{1, 2, ..., 9\}$.

It should be noted that we used the frequency of interior solutions in the original study, but as we will see, subjects used interior solutions so infrequently in the field that it is more appropriate to use the number of interior solutions instead. The experiment was pre-registered[1] and approved by the Ethics Committee of Universidad Loyola Andalucía on 28 April 2019. The study was conducted in Santa Rosa de Copán, Honduras, by a consultancy firm (PILARH) as part of a World Bank project. The experimental instructions and tasks can be found in Appendix **??** or along with the datasets on Mendeley Data. A sample of $n = 360$ subjects participated in the experiment and $n = 329$ subjects completed the task. They all signed an informed consent form and performed both tasks in random order: $n_M = 157$ did MPL first and $n_V = 172$ did VCTP first. All subjects received a show-up fee of 25 lempiras and were paid real payments of between 50 and 100 lempiras (L100 ≡ $4.1), with the largest amount roughly

[1] https://aspredicted.org/dx52q.pdf

corresponding to half a day of work. The distribution of subjects by treatment according to administration mode and number of coins was, with 5 (10) referring to the number of coins and S (E) to the management type: $n_{5,S} = 69$ in the Self-Administered 5-coins task, $n_{10,S} = 77$ in the Self-Administered 10-coins task, $n_{5,E} = 91$ in the Externally-Administered 5-coins task and $n_{10,E} = 92$ in the Externally-Administered 10-coins task.[2]

3 Econometric Approach

Throughout our analysis, we estimate the following simple linear regression model to identify the causal effects of the VCTP mechanism, the use of enumerators and the number of coins on different outcome variables:

$$y_i = \beta_0 + \boldsymbol{\gamma_e} * \boldsymbol{X_{ie}} + \boldsymbol{\gamma_r} * \boldsymbol{X_{ir}} + \boldsymbol{\gamma_c} * \boldsymbol{X_{ic}} + \epsilon_i \tag{1}$$

Where y_i is the outcome variable for each individual; $\boldsymbol{X_{ie}}$ is the vector of the explanatory variables; $\boldsymbol{X_{ir}}$ is the vector of the interaction variables; $\boldsymbol{X_{ic}}$ is the vector of the control variables and ϵ_i is the error term.

The outcome variable y_i refers to the four measurements of Section 2: *Time* is the response time in seconds that subjects need to answer the task; *Cons* is a dummy variable taking value 1 if subjects are consistent in the task and 0 otherwise; *NumFut* is the total amount of coins allocated to the future in the task and *NumInt* is the frequency of the use of interior solutions in the task by subjects.

The set of explanatory variables refers to three variables. The first is the dummy

[2]The precise numbers were $n_{5,S} = 35$, $n_{10,S} = 33$, $n_{5,E} = 47$, $n_{10,E} = 42$ for the MPL task first and $n_{5,S} = 34$, $n_{10,S} = 44$, $n_{5,E} = 44$, $n_{10,E} = 50$ for the VCTP task first.

variable *VCTP* which takes the value of 1 when subjects are assigned to the VCTP mechanism and 0 for the MPL. The second is the dummy variable *Self-Managed* which take the value of 0 when subjects are self-managed and 1 when they are managed externally, meaning that they receive the help of an enumerator. The third is the dummy variable *FiveCoins* which takes the value of 1 when subjects perform the 5-coin version of the experiment and 0 when they perform the standard 10-coin version. Additionally, we will use as explanatory variables in supplementary analysis the dummy variable *IntructionsClear* taking value 1 when subjects find the instructions clear and 0 otherwise, and the dummy variable *UseInterior* taking value 1 when subjects use interior solutions and 0 otherwise.

The set of interaction variables refers to the interaction terms between explanatory variables. We use $VCTP \times SelfAdmin$ identifying the effect of answering the VCTP task when being self-managed and $VCTP \times FiveCoins$ identifying the effect of answering the VCTP task when using the 5-coin version of the task. We do not include $SelfAdmin \times FiveCoins$ because we believe that the effect would be too small to be identified if it exists[3]. Additionally, in our additional analysis, we will use the interaction term $VCTP \times InstructionsClear$ to identify the effect of answering the VCTP task when finding the instructions clear. We will also employ in supplementary analysis the interaction terms $UseInterior \times SelfAdmin$ to identify the effect of using interior solutions when being self-administered and $UseInterior \times FiveCoins$ to identify the effect of using interior solutions when answering the 5-coin task.

The set of control variables refers to the two control variables, which are the age of subjects in years and the gender of subjects, a dummy variable taking

[3]Regressions including this interaction term confirmed this intuition

value 1 when subjects are female and 0 otherwise.

It should be noted that we do not include interaction terms when testing whether VCTP affects the use of interior solutions (model 7 and 8) because subjects are not supposed to use interior solutions in MPL. However, it is worth noting that 9 out of 329 subjects (2.7%) still did so. Finally, we only take into account the first task answered by subjects in the analysis and therefore have a between-subjects design.

4 Attrition and Questionnaires

We start by examining attrition in our experiment to understand why 31 subjects did not complete the task. In the self-administered condition, 13 subjects could not read and thus required the assistance of an enumerator to complete the experiment. We have five additional subjects who declined to answer the task, with two of them in the self-administered group and three of them in the externally-administered group. We lost 9 additional subjects in the self-administered condition because they did not mark all the coins when answering the task. Finally, we lost 4 additional observations in the self-administered condition due to a scanner error. We conclude that in the self-administered condition, we lost 7.47% of the 174 subjects due to illiteracy and an additional 5.14% due to errors when answering the task. These findings underscore the significant role of enumerators in preserving sample size.

We now assess the balance in control variables between the MPL and VCTP groups through a difference of means test to validate the meaningfulness of the comparison. We also conduct the same analysis for each combination of the number of coins and administration mode to assess the meaningfulness of com-

Table 1: Balance check by task

Overall	n	$mean_M$	$mean_V$	$M-V$	$p-value$	$adj.p-value$
Age	329	33.32	34.10	-0.78	0.420	0.433
Female	329	0.892	0.843	0.049	0.196	0.386
FiveCoins SelfAdmin	n	$mean_M$	$mean_V$	$M-V$	$p-value$	$adj.p-value$
Age	69	32.60	35.24	-2.64	0.267	0.282
Female	69	0.943	0.735	0.208	0.018	0.039
FiveCoins ExtAdmin	n	$mean_M$	$mean_V$	$M-V$	$p-value$	$adj.p-value$
Age	91	32.32	34.14	-1.82	0.267	0.472
Female	91	0.915	0.886	0.029	0.653	0.669
TenCoins SelfAdmin	n	$mean_M$	$mean_V$	$M-V$	$p-value$	$adj.p-value$
Age	77	34.79	33.52	1.27	0.525	0.773
Female	77	0.879	0.886	-0.007	0.920	0.920
TenCoins ExtAdmin	n	$mean_M$	$mean_V$	$M-V$	$p-value$	$adj.p-value$
Age	92	33.90	33.80	0.1	0.955	0.991
Female	92	0.833	0.840	-0.007	0.932	0.991

paring MPL and VCTP conditions within these combinations. Table 1 presents the results of these tests, including Romano-Wolf adjusted p-values for multiple testing in the last column. We observe that the only distinction between conditions is a 20.8% higher proportion of female subjects in MPL compared to VCTP when using the 5-coin version of the task with external administration ($p = 0.039$), otherwise we see that the MPL and VCTP populations exhibit similar characteristics ($p \geq 0.282$). Additional analysis in Section **??** show the same results for the number of coins (Table **??**) and the administration mode (Table **??**). We therefore conclude that our sample allows us to estimate the causal effects of the VCTP treatment, administration mode and number of coins on the outcomes.

5 Results

Table 2 presents a summary of the variables in our analysis, comparing the MPL and VCTP tasks, irrespective of the number of coins and management

type. The mean response time for subjects was 217.57 seconds for the MPL task and 235.70 seconds for the VCTP task, with a one-sided t-test marginally rejecting the equality between conditions ($p = 0.084$). We have 88.5% subjects consistent in the MPL task and 71.5% subjects consistent in the VCTP task, with a t-test rejecting the equality between conditions ($p < 0.001$). On average, subjects allocated 40.07 coins to the future in the MPL task and 38.83 coins in the VCTP task, with a t-test not rejecting the equality between tasks ($p = 0.538$). Additionally, subjects allocated an average of 4.58 coins to interior solutions, and a t-test showed a significant difference from zero ($p < 0.001$). It therefore seems that subjects indicate similar answers to the MPL and VCTP task, but they answer MPL slightly more rapidly and the additional complexity of VCTP decreases consistency for little gain in precision. Section **??** extends this analysis. Table **??** displays the same results by number of coins, showing that the 5-coin task reduces response time but also reduces the number of interior solutions and therefore decreases the precision of measurement. Table **??** displays the same results by administration mode, showing that enumerators decrease response time. Table **??** displays the results by task and number of coins, showing that subjects are less consistent in VCTP regardless of the number of coins of the task. Finally, Table **??** displays the results by task and administration mode, showing that self-administered subjects need more time and are less consistent with VCTP. We therefore conclude from this first look at the results that subjects might face difficulties with VCTP, that enumerators improve the quality of results and that the 5-coin task is perhaps not an improvement over the 10-coin task.

Table 3 displays the results of the linear regressions on measurements of interest. Regressions were performed on the variables of interest both without

Table 2: Summary statistics for the main variables used in our analysis by task

Variable	*Definition*	*n*	*Mean*	*Std.Dev*	*Min*	*Med*	*Max*
TimeMPL	Response time in the MPL task (in seconds)	138	217.57	112.07	81	190.5	598
TimeVCTP	Response time in the VCTP task (in seconds)	152	235.70	110.79	69	210.5	592
ConsMPL	Consistency of subjects in the MPL task	157	0.885	0.320	0	1	1
ConsVCTP	Consistency of subjects in the VCTP task	172	0.715	0.453	0	1	1
NumFutMPL	Number of future allocations in the MPL task	157	40.07	19.37	0	50	60
NumFutVCTP	Number of future allocations in the VCTP task	172	38.83	17.25	0	40	60
NumInt	Number of interior solutions used in the VCTP task	172	4.58	9.24	0	0	40
Age	Age of subjects (in years)	329	33.73	8.67	22	32	70
Female	Gender of subjects (1=female)	329	0.866	0.341	0	1	1

and with controls to estimate the effect of the explanatory variables VCTP task, number of coins, administration mode on these variables and the interaction terms between VCTP and others explanatory variables. We use OLS regressions on response time with robust standard errors in columns (1) and (2), probit regressions on consistency in columns (3) and (4), tobit regressions on the number of future allocations in columns (5) and (6) and on the number of interior solutions in columns (7) and (8). We do not use interactions terms in (7) and (8) because interior solutions should only be used with VCTP. Standard errors are reported in parentheses and p-values are shown in brackets. Adjusted R-squared is reported for regressions on response time and log-likelihood is reported for regressions on consistency, number of future allocations and number of interior solutions.

We see that $VCTP$ has no significant effects on the time, consistency or number of future allocations ($p \geq 0.409$). However, in column (3), the interaction term between VCTP and self-administration significantly estimates a strong negative effect ($p = 0.037$) that remains significant after adding controls ($p = 0.034$). Column (7) and (8) shows that subjects are using the additional precision of interior solutions ($p < 0.001$) but make little use of them. Interestingly, we find that enumerators have no effect on response time and allocations to the future.

Regarding the number of coins in the task, we see in column (1) that the 5-coin task marginally decreases response time ($p = 0.096$) and this result remain in column (2) after adding controls ($p = 0.092$), but it does not increase consistency in the task and it also marginally decreases the number of interior solutions in column (7) ($p = 0.065$), with this result remaining significant in column (8) after adding controls ($p = 0.063$). We notice that *Age* decreases the number of future allocations in column (6) ($p = 0.039$). We conclude that VCTP elicits similar results to MPL in the field in terms of response time, consistency and revealed time preferences. We also observe that subjects do not take advantage of the additional precision offered by VCTP and apparently face significant difficulties being consistent in the task without enumerators. These results suggest that *there is no clear advantage to using VCTP rather than MPL in the field.* Furthermore, we find indications that the 5-coin task is not an improvement over the 10-coin task because it reduces both response time and precision without increasing the consistency of subjects.

One limitation of the previous analysis is that we consider the task in its entirety, while each task decision can have a different influence on the results. For instance, the time required to answer the first decision is likely to be greater than that for the last decision, consistency may be more frequently compromised in the third or fourth decisions, the number of future allocations should be lower in the first decision and higher in the last decision, and the use of interior solutions may be more prevalent in the second decision. We therefore run the same analysis than before with round fixed-effect for consistency, number of future solutions and number of interior solutions. We only have the overall response time and therefore run fixed effect regressions for this variable. We also use logit regressions instead of probit regressions to estimate the effects of the in-

Table 3: OLS, probit and tobit estimations of the impact of the VCTP mechanism, number of coins and administration mode on response time, consistency, allocations to the future and interior solutions.

	(1) Time	(2) Time	(3) Cons	(4) Cons	(5) NumFut	(6) NumFut	(7) NumInt	(8) NumInt
$VCTP$	-1.916	-2.169	-0.220	-0.209	2.775	2.495	4.333***	4.364***
	(20.739)	(20.861)	(0.272)	(0.274)	(3.357)	(3.330)	(0.735)	(0.737)
	[0.926]	[0.917]	[0.419]	[0.445]	[0.409]	[0.454]	[<0.001]	[<0.001]
$SelfAdmin$	10.413	10.348	0.241	0.241	3.101	3.112	1.022	1.022
	(18.684)	(18.702)	(0.272)	(0.274)	(2.927)	(2.903)	(0.738)	(0.737)
	[0.578]	[0.580]	[0.376]	[0.380]	[0.290]	[0.285]	[0.167]	[0.167]
$FiveCoins$	-31.693*	-32.613*	0.177	0.215	2.498	1.802	-1.362*	-1.369*
	(18.957)	(19.278)	(0.264)	(0.267)	(2.903)	(2.892)	(0.735)	(0.734)
	[0.096]	[0.092]	[0.504]	[0.420]	[0.390]	[0.534]	[0.065]	[0.063]
$VCTP \times SelfAdmin$	39.142	39.886	-0.711**	-0.727**	-4.999	-4.782		
	(26.386)	(26.368)	(0.341)	(0.343)	(4.039)	(4.010)		
	[0.139]	[0.131]	[0.037]	[0.034]	[0.217]	[0.234]		
$VCTP \times FiveCoins$	5.820	7.315	-0.180	-0.234	-3.624	-2.553		
	(26.024)	(26.193)	(0.335)	(0.339)	(4.023)	(4.012)		
	[0.823]	[0.780]	[0.592]	[0.490]	[0.368]	[0.525]		
Age		-0.105		0.016		-0.239**		0.010
		(0.847)		(0.010)		(0.115)		(0.042)
		[0.901]		[0.115]		[0.039]		[0.818]
$Female$		11.353		-0.090		3.445		0.807
		(16.302)		(0.243)		(2.947)		(1.081)
		[0.487]		[0.712]		[0.243]		[0.456]
Constant	229.804***	223.63***	1.018***	0.562	37.422***	42.676***	0.402	-0.640
	(15.789)	(37.396)	(0.209)	(0.457)	(2.462)	(5.367)	(0.732)	(1.912)
	[0.000]	[0.000]	[0.000]	[0.219]	[0.000]	[0.000]	[0.583]	[0.738]
Estimation Method	OLS	OLS	Probit	Probit	Tobit	Tobit	Tobit	Tobit
Observations	290	290	329	329	329	329	329	329
Adj.R^2 // LL	0.033	0.027	-155.393	-153.987	-1420.836	-1417.858	-1089.810	-1089.516
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Robust standard errors for OLS regressions. p-values in brackets. ***, ** and * denote significance at the 1%, 5% and 10% levels.

dependent variables on consistency, as fixed-effects probit regressions for panel data do not exist. Additionally, consistency in the first round is omitted from the analysis since subjects are necessarily consistent in the first decision. Table 4 displays the results of these regressions. We see that $VCTP$ has no effect on response time, consistency or number of future solutions and that subjects make very little use of interior solutions. It therefore gives further evidence that VCTP is answered similarly than MPL. We will now turn our attention toward administration mode and number of coins, but not before remarking that age increases consistency ($p = 0.017$) and decreases the number of allocations to

future ($p < 0.001$) while female are allocating more to the future ($p = 0.039$).

Regarding the administration mode, we see in column (3) that $SelfAdmin$ increases consistency in the task ($p < 0.001$) with this result remaining significant in column (4) after adding controls ($p < 0.001$). Self-administration also marginally increases the number of future solutions in column (5) ($p = 0.060$) and in column (6) after adding controls ($p = 0.058$). It also has a small effect on increasing the number of interior solutions in column (7) ($p = 0.007$) and in column (8) after adding controls ($p = 0.007$). Now considering the interaction term between VCTP and self-administration, we see a relatively large increase of around thirty-nine seconds of the response time in column (1) ($p < 0.001$) that remains significant after adding controls ($p < 0.001$). We also have a relatively large effect in decreasing consistency in column (3) ($p < 0.001$) and in column (4) after adding controls ($p < 0.001$). It also has a small and significant effect on reducing the number of future allocations in column (5) ($p = 0.028$) and in column (6) after adding controls ($p = 0.035$). We therefore conclude that being self-administered increases consistency, except in the self-administered VCTP task in which it has a large effect in decreasing it. We also see that self-administration in VCTP increases response time, decreases the number of future solutions and increases the number of interior solutions. We interpret these results as suggesting that field subjects struggle to handle the complexity of the VCTP task on their own, but they seem willing to understand and utilize it.

Regarding the number of coins, we see in column (1) that the 5-coin task has a large effect in decreasing response time ($p < 0.001$) with this effect remaining significant in column (2) after adding controls ($p < 0.001$). We also see in col-

Table 4: OLS, probit and tobit estimations with fixed-effects of the impact of the VCTP mechanism, number of coins and administration mode on response time, consistency, allocations to the future and interior solutions.

	(1) Time	(2) Time	(3) Cons	(4) Cons	(5) NumFut	(6) NumFut	(7) NumInt	(8) NumInt
VCTP	-1.916	-2.169	-0.107	-0.094	0.462	0.416	0.722***	0.727***
	(8.470)	(8.471)	(0.241)	(0.242)	(0.315)	(0.314)	(0.063)	(0.063)
	[0.821]	[0.798]	[0.656]	[0.699]	[0.142]	[0.185]	[0.000]	[0.000]
SelfAdmin	10.413	10.348	1.288***	1.286***	0.517*	0.519*	0.170***	0.170***
	(7.760)	(7.768)	(0.331)	(0.332)	(0.275)	(0.274)	(0.063)	(0.063)
	[0.180]	[0.183]	[0.000]	[0.000]	[0.060]	[0.058]	[0.007]	[0.007]
FiveCoins	-31.693***	-32.613***	0.585**	0.628**	0.416	0.300	-0.227***	-0.228***
	(7.577)	(7.609)	(0.272)	(0.273)	(0.273)	(0.273)	(0.063)	(0.063)
	[0.000]	[0.000]	[0.032]	[0.022]	[0.127]	[0.271]	[0.000]	[0.000]
VCTP×SelfAdmin	39.142***	39.886***	-2.133***	-2.152***	-0.833**	-0.797**		
	(10.709)	(10.730)	(0.372)	(0.373)	(0.379)	(0.378)		
	[0.000]	[0.000]	[0.000]	[0.000]	[0.028]	[0.035]		
VCTP×FiveCoins	5.820	7.315	-0.629**	-0.704**	-0.604	-0.425		
	(10.484)	(10.538)	(0.320)	(0.322)	(0.378)	(0.378)		
	[0.579]	[0.488]	[0.050]	[0.029]	[0.110]	[0.261]		
Age		-0.105		0.021**		-0.040***		0.002
		(0.302)		(0.009)		(0.011)		(0.004)
		[0.728]		[0.017]		[0.000]		[0.654]
Female		11.353		-0.205		0.574**		0.135
		(7.761)		(0.211)		(0.278)		(0.093)
		[0.144]		[0.332]		[0.039]		[0.147]
Constant	229.804***	223.630***			6.237***	7.113***	0.067	-0.107
	(6.269)	(14.222)			(0.764)	(0.886)	(0.063)	(0.164)
	[0.000]	[0.000]			[0.000]	[0.000]	[0.286]	[0.516]
Estimation Method	OLS	OLS	Logit	Logit	Tobit	Tobit	Tobit	Tobit
Fixed Effect // Round Fixed Effect	FE	FE	RFE	RFE	RFE	RFE	RFE	RFE
Number of Round	6	6	5	5	6	6	6	6
Observations	290	290	329	329	329	329	329	329
Within R^2 // LL	0.049	0.051	-624.38	-620.65	-5635.76	-5626.41	-3459.43	-3458.32
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Robust standard errors for OLS regressions. p-values in brackets. ***, ** and * denote significance at the 1%, 5% and 10% levels.

umn (3) that the 5-coin task increases consistency ($p = 0.032$) with this result remaining significant in column (4) after adding controls ($p = 0.022$). Column (7) suggests that the 5-coin task has a small effect on reducing the number of interior solutions ($p < 0.001$) with this effect remaining significant in column (8) after adding controls ($p < 0.001$). Now looking at the interaction term between VCTP and the 5-coin task, we see in column (3) that it decreases consistency in the task ($p = 0.050$) with this effect remaining significant in column (4) after adding controls ($p = 0.029$). These results therefore confirm that the 5-coin version of the task reduces response time but also decreases the use of interior

solutions and therefore precision of measurement. We additionally find that the 5-coin task increases consistency, except in VCTP in which it has the opposite effect of decreasing it. We therefore conclude that the 5-coin task is an improvement over the 10-coin task when experimenters use the MPL task, while the loss of information resulting from the removal of the additional precision of VCTP suggests that the 10-coin version of the task is strictly superior with a sample that utilizes interior solutions correctly.

In conclusion, our findings suggest that the responses of subjects in the VCTP task are similar to those in the MPL task. Hence, the additional complexity of the VCTP task appears unnecessary for field subjects, especially given that results from the self-administration condition demonstrate that subjects have difficulties understanding the added complexity of interior solutions, despite their willingness to do so. When employing the MPL version of the task, the 5-coin task is preferable because it enhances the consistency of subjects.

We saw that subjects answer VCTP similarly than MPL. We should therefore look at *how* field subjects are using the interior solutions of VCTP. Figure 3 displays the multi-histograms of allocations to the future in the 10-coin MPL and 10-coin VCTP tasks for each decision. The 5-coin case is relegated to the appendix (Figure **??**) for the sake of concision. Both figures are quite similar and illustrate that the decreased utilization of interior solutions coincides with a tendency to distribute coins equally between periods. The multi-histograms therefore indicates that field subjects using interior solutions focus on the salient choice of separating coins equally between periods. Compared to the findings of Prissé (2023) that demonstrate lab subjects using the full range of interior solutions and a modal distribution that grows with increasing interest rates, the

results of this experiment indicate that field subjects may have a limited grasp of interior solutions. Furthermore, we observe that the allocation patterns of field subjects in the 10-coin task differ from those of lab subjects in the same task, as depicted in Figure **??**. We observe that 24.85% of field subjects allocate everything to the future at a 0% interest rate, whereas only 4.64% of lab subjects do the same and a t-test rejects the equality between conditions ($p < 0.001$). Furthermore, 50.89% of field subjects switch entirely to future preference at the first positive interest rate of 20%, compared to 26.49% of lab subjects ($p < 0.001$). Additionally, 15.98% of field subjects allocate everything to the early period at the highest interest rate of 100%, whereas only 3.97% of lab subjects continue to do so ($p < 0.001$). These results suggest that a significant proportion of field subjects have strong preferences to receive the money later or to receive the money early. We overall conclude that field subjects have more polarized preferences and are perhaps diametrically opposed in this regard to the sophisticated preferences of lab subjects.

The decreased level of subject sophistication in their responses to the task, coupled with the observed decrease in the quality of responses in the most challenging condition of the VCTP task when self-administered, prompts us to question whether subjects have a comprehensive understanding of the task. To address this, we included a questionnaire in which we asked subjects whether they found the task instructions clear. Only 35.87% of the subjects reported that they found the instructions clear. Importantly, a t-test does not reveal any significant difference in this percentage between administration modes ($p = 0.568$). It is worth noting that although the question was posed at the end of the experiment, encompassing the instructions for both the first and second tasks, a t-test still does not yield any significant difference in the responses based on the

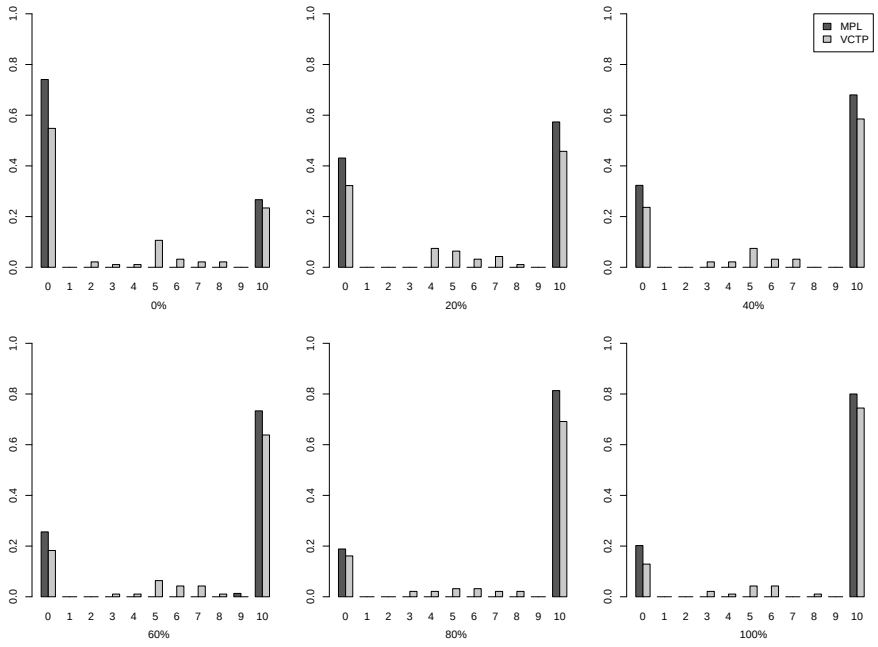

Figure 3: Multi-histograms of allocations to the future by task for the 10-coin task.

first task answered ($p = 0.419$). This pattern is also observed when considering the number of coins ($p = 0.463$). We therefore find direct evidence that subjects do not have a clear understanding of the task, raising questions about its potential influence on the results. Table 5 repeats the previous analysis using *InstructionsClear* as the explanatory variable and includes its interaction term with answering the VCTP task, denoted as $VCTP \times InstructionsClear$. We see in column (3) that finding the instructions clear reduces consistency ($p = 0.012$) and this result remain significant in column (4) after adding controls ($p = 0.023$). Furthermore, column (7) indicates that finding the instructions clear increases the number of interior solutions ($p = 0.001$) in VCTP and this result remain significant in column (8) after adding controls ($p = 0.001$). Now examining the interaction term with VCTP, we observe in column (1) that subjects who found

the instructions clear in VCTP need more time to answer it ($p = 0.031$), and this result remains significant in column (6) after adding controls ($p = 0.025$). We also see in column (5) that subjects who found the instructions clear in VCTP marginally decrease the number of future allocations ($p = 0.061$). These results indicate that subjects who found the instructions clear are more likely to use interior solutions and take the time to think about them. However, it is noteworthy that these subjects are also less likely to be consistent, suggesting that they might be using these interior solutions incorrectly. Consequently, we will analyze whether the use of interior solutions is associated with a decrease in task performance.

We therefore investigate whether this decline in the quality of responses is associated with the use of interior solutions in VCTP. Table 6 presents the results of linear regressions that estimate the effect of $UseInterior$ on response time with fixed-effects, and on consistency, the number of future allocations, and the number of interior solutions with round fixed-effects. We also employ interaction terms between $UseInterior$ and $SelfAdmin$ and between $UseInterior$ and $FiveCoins$ to explore whether there is a specific impact of using interior solutions when subjects are self-administered or when they are answering the 5-coin task. We see in column (1) that using interior solutions increases response time by an estimated 90 seconds ($p < 0.001$), and this result remains significant in column (2) after adding controls ($p < 0.001$). Column (3) shows that using interior solutions decreases the likelihood of being consistent in the task ($p < 0.001$), and this result remains significant in column (4) after adding controls ($p < 0.001$).

We also observe that using interior solutions marginally decreases the number

Table 5: OLS, probit and tobit estimations with fixed-effects of the impact of finding the instructions clear, VCTP mechanism, number of coins and administration mode on response time, consistency, allocations to the future and interior solutions.

	(1) Time	(2) Time	(3) Cons	(4) Cons	(5) NumFut	(6) NumFut	(7) NumInt	(8) NumInt
InstructionsClear	-10.287	-11.137	-0.680**	-0.623**	0.124	-0.040	0.216***	0.227***
	(8.009)	(8.113)	(0.272)	(0.274)	(0.281)	(0.284)	(0.066)	(0.066)
	[0.199]	[0.170]	[0.012]	[0.023]	[0.659]	[0.887]	[0.001]	[0.001]
VCTP	-10.262	-10.953	-0.342	-0.291	0.697**	0.567	0.736***	0.740***
	(9.514)	(9.539)	(0.296)	(0.297)	(0.349)	(0.348)	(0.063)	(0.063)
	[0.281]	[0.251]	[0.248]	[0.328]	[0.046]	[0.103]	[0.000]	[0.000]
SelfAdmin	9.390	9.366	1.252***	1.266***	0.523*	0.517*	0.161**	0.160**
	(7.791)	(7.796)	(0.332)	(0.333)	(0.275)	(0.274)	(0.063)	(0.063)
	[0.228]	[0.230]	[0.000]	[0.000]	[0.057]	[0.059]	[0.011]	[0.011]
FiveBalls	-32.973***	-33.966***	0.512*	0.560**	0.427	0.298	-0.214***	-0.215***
	(7.633)	(7.680)	(0.275)	(0.276)	(0.273)	(0.274)	(0.063)	(0.063)
	[0.000]	[0.000]	[0.063]	[0.043]	[0.118]	[0.277]	[0.001]	[0.001]
VCTP×SelfAdmin	37.658***	38.276***	-2.098***	-2.139***	-0.772**	-0.727*		
	(10.757)	(10.780)	(0.374)	(0.375)	(0.381)	(0.380)		
	[0.000]	[0.000]	[0.000]	[0.000]	[0.042]	[0.055]		
VCTP×FiveBalls	9.053	10.457	-0.524	-0.607*	-0.617	-0.430		
	(10.539)	(10.602)	(0.323)	(0.325)	(0.379)	(0.379)		
	[0.390]	[0.324]	[0.105]	[0.062]	[0.103]	[0.257]		
VCTP×InstructionsClear	24.016**	25.025**	0.355	0.281	-0.741*	-0.551		
	(11.120)	(11.184)	(0.323)	(0.325)	(0.395)	(0.396)		
	[0.031]	[0.025]	[0.271]	[0.387]	[0.061]	[0.163]		
Age		-0.181		0.018**		-0.040***		0.003
		(0.306)		(0.009)		(0.011)		(0.004)
		[0.554]		[0.041]		[0.000]		[0.405]
Female		8.727		-0.345		0.555**		0.143
		(7.843)		(0.220)		(0.281)		(0.094)
		[0.266]		[0.118]		[0.048]		[0.128]
Constant	234.515***	233.568***			6.181***	7.159***	-0.018	-0.250
	(7.257)	(15.258)			(0.773)	(0.907)	(0.068)	(0.170)
	[0.000]	[0.000]			[0.000]	[0.000]	[0.790]	[0.141]
Estimation Method	OLS	OLS	Logit	Logit	Tobit	Tobit	Tobit	Tobit
Fixed Effect // Round Fixed Effect	FE	FE	RFE	RFE	RFE	RFE	RFE	RFE
Number of Round	6	6	5	5	6	6	6	6
Observations	289	289	328	328	328	328	328	328
Within R^2 // LL	0.051	0.051	-614.49	-610.74	-5616.19	-5607.06	-3446.01	-3444.59
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Robust standard errors for OLS regressions. p-values in brackets. ***, ** and * denote significance at the 1%, 5% and 10% levels.

of future solutions in column (5) ($p = 0.060$), and this result remains significant in column (6) after adding controls ($p = 0.065$). Finally, the $UseInterior$ coefficient in column (7) and (8) indicates that subjects using interior solutions in the VCTP 10-coin task are estimated to use around 2.5 of them out of 9 in each decision ($p < 0.001$ for both). Now, examining the interaction terms, we observe in column (5) that using interior solutions when being self-administered marginally increases the number of interior solutions ($p = 0.052$), and this result remains significant after adding controls ($p = 0.093$). Column (1) estimates

Table 6: OLS, probit and tobit estimations with fixed-effects of the impact of using interior solutions, number of coins and administration mode on response time, consistency, allocations to the future and interior solutions.

	(1) Time	(2) Time	(3) Cons	(4) Cons	(5) NumFut	(6) NumFut	(7) NumInt	(8) NumInt
UseInterior	93.523***	93.181***	-1.578***	-1.604***	-0.881*	-0.852*	2.517***	2.524***
	(12.000)	(12.001)	(0.324)	(0.327)	(0.468)	(0.462)	(0.103)	(0.103)
	[0.000]	[0.000]	[0.000]	[0.000]	[0.060]	[0.065]	[0.000]	[0.000]
SelfAdmin	46.824***	47.591***	-0.364	-0.400	-0.590*	-0.459	-0.069	-0.068
	(8.138)	(8.197)	(0.293)	(0.295)	(0.312)	(0.309)	(0.095)	(0.095)
	[0.000]	[0.000]	[0.215]	[0.175]	[0.059]	[0.137]	[0.466]	[0.477]
FiveCoins	-8.701	-8.338	0.896***	0.873***	-0.182	-0.084	-0.297***	-0.301***
	(7.873)	(7.882)	(0.319)	(0.320)	(0.306)	(0.303)	(0.094)	(0.094)
	[0.269]	[0.290]	[0.005]	[0.006]	[0.553]	[0.781]	[0.002]	[0.001]
UseInterior×*SelfAdmin*	-3.676	-3.168	-0.374	-0.311	1.098*	0.940*		
	(15.767)	(15.978)	(0.402)	(0.405)	(0.564)	(0.559)		
	[0.816]	[0.843]	[0.353]	[0.442]	[0.052]	[0.093]		
UseInterior×*FiveCoins*	-48.275***	-47.481***	-2.095***	-2.111***	-0.195	-0.175		
	(15.921)	(15.917)	(0.429)	(0.431)	(0.564)	(0.557)		
	[0.002]	[0.003]	[0.000]	[0.000]	[0.729]	[0.753]		
Age		0.234		0.024*		-0.041***		0.011**
		(0.417)		(0.013)		(0.015)		(0.006)
		[0.575]		[0.067]		[0.006]		[0.044]
Female		16.317*		-0.205		1.459***		0.156
		(9.203)		(0.288)		(0.347)		(0.128)
		[0.077]		[0.477]		[0.000]		[0.225]
Constant	202.374***	180.247***			6.920***	7.017***	0.169**	-0.345
	(6.296)	(17.704)			(0.694)	(0.916)	(0.081)	(0.237)
	[0.000]	[0.000]			[0.000]	[0.000]	[0.038]	[0.146]
Estimation Method	OLS	OLS	Logit	Logit	Tobit	Tobit	Tobit	Tobit
Fixed Effect // Round Fixed Effect	FE	FE	RFE	RFE	RFE	RFE	RFE	RFE
Number of Round	6	6	5	5	6	6	6	6
Observations	152	152	172	172	172	172	172	172
Within R^2 // LL	0.152	0.155	-310.41	-308.50	-2928.54	-2915.49	-1881.09	-1878.44
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Robust standard errors for OLS regressions. p-values in brackets. ***, ** and * denote significance at the 1%, 5% and 10% levels.

that using interior solutions when answering the 5-coin version of the task reduces response time ($p = 0.002$), with this result remaining significant after adding controls ($p = 0.003$). Furthermore, Column (3) shows that using interior solutions when answering the 5-coin version of the task strongly decreases consistency in the task ($p < 0.001$) with this result remaining significant in column (4) after adding controls ($p < 0.001$).

Additionally, we remark that self-administration increases response time in column (1) ($p < 0.001$) with this result remaining significant in column (2) after adding controls ($p < 0.001$). Self-administration also decreases the number of future solutions in column (5) ($p = 0.059$), but this effect disappears after

adding controls. Regarding the number of coins of the task, column (3) shows that the 5-coin task marginally increase consistency ($p = 0.005$) and this result remain significant after adding controls ($p = 0.006$). The 5-coin task also decreases the number of interior solutions in column (7) ($p = 0.002$) and this result remain significant in column (8) after adding controls ($p = 0.001$). It should be noted that older subjects exhibit marginally higher consistency in column (4) ($p = 0.067$), allocate less to the future in column (6) ($p = 0.006$), and make more extensive use of interior solutions in column (8) ($p = 0.044$). We also see that female subjects have marginally higher response time in column (2) ($p = 0.077$) and that they allocate more to the future in column (6) ($p < 0.001$). We therefore conclude that using interior solutions leads to increased response times and reduced consistency, with the latter effect being especially prominent in the 5-coin version of the task. This provides direct evidence that the decrease in the quality of results is associated with the added complexity of VCTP, supporting the use of MPL with field subjects. Additionally, our findings suggest that the 5-coin version of the VCTP task not only reduces the precision of the task but also diminishes consistency, further supporting the conclusion that the 5-coin task is not superior to the 10-coin version.

6 Discussion

We evaluated the VCTP task of Prissé (2023) in a field setting, comparing it to the MPL mechanism using the same experimental design. Our aim was to validate the results of the lab experiment in a real-world context, demonstrating that VCTP requires a similar amount of time and exhibits similar consistency to MPL while providing more precise insights into time preferences. Additionally, we examined whether external administration was necessary to maintain data quality and whether reducing the number of task coins to five improved data

quality. We found that field subjects respond similarly in terms of response time, consistency, and the number of future allocations in both the VCTP and MPL tasks. Additionally, they show limited utilization of the interior solutions of VCTP. When they do utilize them, it results in longer response times and decreased consistency, indicating that they face difficulties in handling the additional complexity of the VCTP task. Results therefore suggest that there is no advantage of using the VCTP task in the field over its MPL version. We also found that enumerators are crucial to maintain sample size and the quality of data in the VCTP task by reducing response time and increasing consistency. Importantly, they also do not influence the elicitation of time preferences. Finally, we found that the 5-coin version of the task is not an improvement over the 10-coin version because, while it reduces task time and increases consistency in MPL, it also reduces the precision of the answers and consistency in VCTP. These results suggest that the 5-coin MPL is perhaps the most suitable option for field subjects. Overall, we conclude that the visual methodology passes the test in the field, since subjects answer the task quickly, exhibit high consistency and reveal their time preferences. However, results also indicate that subjects have difficulty understanding the task, and the simplest 5-coin MPL version may be the most suitable option for them. These contradictory evidences between the quality of results and the reduced understanding of subjects leads to an interesting possibility: the visual methodology allows subjects to make sense of a complexity they would otherwise not handle by facilitating their use of salient allocations. Indeed, the field version of the experiment uses piggybanks filled up to the interest rate to explain this concept to subjects. It is possible that in conjunction with explicitly displaying the amounts of money associated with these interest rates, subjects that are initially unclear about what they have to do are able to correctly navigate the task by making their choices according to

the amounts indicated by the piggybanks. We therefore conclude that the visual methodology might improve the quality of data collected in the field by indicating to subjects the minimum amount of complexity they have to understand to correctly answer the task.

7 References

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