Narrow Bracketing in Work Choices[*]

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Abstract

Many important economic outcomes result from the cumulative effects of smaller choices and events, so the best outcomes require, minimally, accounting for total outcomes so far. We formally show that narrow bracketing — the neglect of such accounting — is costly and identified if and only if the willingness to pay for an option varies across all single choice sets, unifying, extending, and generalizing prior results. We empirically document narrow bracketing in work choices in a pre-registered experiment on Amazon Mechanical Turk: bracketing due to separate or combined choice presentations changes average reservation wages by 13-28%. In our experiment, broad bracketing is so simple to implement that narrow bracketing is hard to reconcile with optimal conservation of cognitive resources. An attempt at debiasing by drawing attention to the interdependencies has limited success. **JEL Classifications: C91, D91, J01**

1 Introduction

Many of the most important economic outcomes — such as savings, health, careers, and relationships — result from countless interdependent decisions. In the work domain, such cumulative decision-making is bound to become even more important as remote, flexible, and online work become more popular (Farrell et al., 2018, 2019). In order to obtain the best outcomes in these circumstances, a person must, in every decision, at least take into account cumulative outcomes so far. Whenever a person fails to do so, she is engaging in narrow bracketing (Read et al. (1999)). The prior literature focuses on non-work choices, such as monetary choices (Tversky and Kahneman (1981), Redelmeier and Tversky (1992), Rabin and Weizsäcker (2009), Koch and Nafziger (2019), Vorjohann (2020), and Dekel et al. (2021)); social choices Exley and Kessler (2018); or both of these and induced preferences (Ellis and Freeman (2020)). Broad bracketing in these situations is either complicated (when combining lotteries), or not necessarily the relevant target (when making social choices). In contrast, we investigate narrow bracketing in economically essential work choices, where accounting for these outcomes is simple and relevant.

Our paper has two main contributions. First, we provide bounds on the costs due to narrow bracketing and characterizes when narrow and broad bracketing are identified for a general class of utility functions. Second, we explore empirically whether workers on Amazon Mechanical Turk bracket work choices broadly, or narrowly, or do neither of these. We do so by looking at whether and how they take into account background work that they are already committed to.

In our first contribution, we provide easily estimable bounds on the costs from narrow bracketing based on the range of the willingness to work under different circumstances. Concretely, we show in Section 2 that bracketing is identified if and only if the willingness to work (WTW) for some option X changes across choice sets.[1] The core intuition is as simple as it is general. Consider a person whose WTW for one hour is \$4 when it is the only option besides not working, but is \$2 when the (unchosen) option of exercising is available. We can offer this person two simultaneous choices that jointly determine total outcomes. The first choice consists of one hour of work for \$3.50 or no work, the second consists of one hour of work for \$2.50 or exercising or nothing. Then if the person brackets narrowly – so that they choose from each choice set ignoring the other choice — they will choose to work for the low pay of \$2.50 while rejecting to work for the high pay of \$3.50. This violates broad bracketing, since they throw away \$1.00.[2] This mistake of using the WTW for the current choice is in fact the central mistake from narrow bracketing. Since changes in WTW can originate from convex disutility, changing risk aversion, violations of expected utility or of the weak axiom of revealed preference (WARP), each of these can lead to potential costs from bracketing by allowing

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[1]While we phrase the results in terms of willingness to work, it applies to non-work choices in the presence of some numeraire by replacing willingness to work by willingness to pay.

[2]This argument extends the logic Tversky and Kahneman (1981), who anticipated changes in risk aversion due to loss aversion. Rabin and Weizsäcker (2009) extended this logic to all expected utility preferences that do not satisfy constant absolute risk aversion. Changes in risk aversion imply a change in WTP for risk, and our argument shows that it extends to all types of preferences.

us to find simultaneous choices where a narrow bracketer is willing to work for a low payment in one choice set, yet unwilling to do the same work for a higher payment in the other choice set, leaving money on the table.

Secondly, we provide direct evidence against broad, and for narrow, bracketing of endowments in work choices in an online experiment. In our main real-effort task experiment, we elicit the smallest payments (called the *reservation wages*) for which participants choose to do 15 tedious tasks on top of some baseline. In all treatments, the *total* outcome of work and payment is determined by the sum of the chosen amounts and the exogenously given endowment, with the endowment prominently displayed at the top of the choice page. But in some treatments, there is no endowment, so that the choice options *alone* make up the total money and work outcomes, while in other treatments there is an endowment of $2.00, 15 required tasks, or both, so that choice options *plus endowments* make up the total outcomes. If participants bracket broadly, then their reservation wages – as well as attrition from the study – should be the same across treatments for which possible total outcomes (choices available plus endowments) are the same. If participants bracket narrowly, their reservation wages should be the same across treatments for which choices available alone (ignoring the endowments) are the same.

We define narrow and broad bracketing formally in Section 2. Consider a person who, when choosing some option Z from a choice set S, derives value $v(Z|S)$ from this. This person chooses two bundles X and Y simultaneously from two arbitrary choice sets S_1 and S_2, and receives the total outcome $X + Y$ from these choices. We say that a person brackets broadly if they maximize their value function over the set of total outcomes $S_1 + S_2$; and that a person brackets narrowly if they maximize it choice set by choice set. We then derive the bounds on the costs from narrow bracketing. Since when the variation in WTW is 0 there are no costs from narrow bracketing and the choices are optimal, this shows that we can identify narrow bracketing if and only if we have variation in WTW.

In Section 3, we describe the direct tests of both broad and narrow bracketing in work choices where workers on Amazon Mechanical Turk are paid to decode sequences of letters to numbers. Our three main treatments are the following. In the first, called *NONE*, there is no money nor work endowment, so that participants choose *total* work and pay, such as choosing between 15 tasks for a total payment of $6.00 or 30 tasks for a total payment ranging from $6.25 to $10.00. In the second treatment, called *BOTH*, there is both a money endowment (the $2.00 participation fee) and a work endowment of 15 required tasks, both displayed at the top of the choice page. So participants choose *additional* work and pay, such as between 0 additional tasks for an extra $4.00 or 15 additional tasks for an extra payment ranging from $4.25 to $8.00. In the final treatment, MONEY/LOW, there is the same money endowment, but no work endowment, so that each choice leads to a total workload that is 15 tasks lower than in the other two treatments. Participants's choices are thus about *total* work and *additional* pay, such as between 0 tasks for an extra $4.00 or 15 tasks for an extra payment ranging from $4.25 to $8.00. Treatments NONE and BOTH have the same total outcomes, so that under broad bracketing their reservation wages should be the same; treatments BOTH and MONEY/LOW have the same choice options amounts, so that under narrow bracketing their reservation wages should

be the same. We also added a (non-preregistered) treatment MONEY, which allows us to test bracketing in the money dimension and work dimension alone.

We report our results in Section 4. As required by our theoretical results, we find WTW changes necessary for identification: the reservation wages for 15 additional tests increase as the baseline level increases, consistent with convex disutility. The reservation wage in NONE and BOTH differ significantly by up to 28%, so we reject broad bracketing. For example, the average reservation wage in BOTH is $2.07 in one choice scenario, while the average corresponding reservation wage in NONE is $2.88, leading to a significant difference of $0.81 (p-value < 0.001). On the other hand, the corresponding reservation wage in MONEY/LOW is $2.31, leading to a difference with treatment BOTH of $0.24 that is not statistically significant (p-value 0.106), so we do not reject narrow bracketing. We similarly reject broad bracketing in the money dimension alone, as well as in the work dimension alone.

We also explore gender differences in bracketing that are suggested by prior literature (Koch and Nafziger (2019)). While we find that women have larger changes in reservation wages from bracketing, our data is consistent with both men and women bracketing narrowly. We know from our results that we can identify bracketing only when the WTW changes across single choices, the primary manifestation of which would be convexity of disutility in our setting. We see in fact that women's choices are consistent with more convex disutility. Therefore women not taking into account their endowment leads to a costlier mistake than for men. This highlights that the costs from bracketing depend both on whether and how much people narrowly bracket, and on how much their WTW changes.

Next we report a pre-registered follow-up experiment aimed at reducing the impact of narrow bracketing. In this follow-up, we run two more treatments that have both money and work endowments, but we describe the additional sequences as being done "before" or "after" the 15 required sequences. Assuming convex disutility of work, we predicted that highlighting additional sequences as "before" the required sequences would possibly draw attention to the endowment, but also make participants think of the early tasks – thus only alleviate narrow bracketing mildly. We also predicted that highlight additional sequences as "after" the required sequences would make participants think of the later and harder sequences, and thus alleviate narrow bracketing. While our results are directionally in line with this, we do not reject narrow bracketing consistently across specifications, and still always reject full broad bracketing.

In Section 5, we argue for narrow bracketing as a suboptimal mistake, ruling out alternative mechanisms. Since participants loose the equivalent of 3 minutes of doing additional tasks from narrow bracketing, we interpret deliberate narrow bracketing to conserve cognitive costs as implausible or done under miscalibrated costs of bracketing. Since we keep information and the overall outcome sets constant across several treatments, we rule out information stories. And since reference-dependence (and other context-dependent preferences) can be applied narrowly (choice set by choice set) or broadly (to the sum of all choice sets) it can interact with, but not explain bracketing. We further discuss why deliberate or motivated bracketing (Hsiaw (2018), Koch and Nafziger (2016), Koch and Nafziger (2020)) and confusion are unlikely to explain our results.

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We conclude with a brief discussion on how to move beyond testing narrow and broad bracketing, towards estimating the strength of bracketing, which aspects people bracket narrowly, and how they might approximate or partially bracket broadly.

2 Conceptual Framework of Narrow Bracketing

In this section, we consider an agent with a given value function v and ask how costly narrow bracketing can be for a person facing two simultaneous choices. We highlight that this cost is fully characterized by the range in the subjective price a person is willing to pay for the same bundle in different contexts. If there exists any variation in this price, a narrow bracketer can be arbitraged by choosing the bundle in one choice context where their price is high, yet not choose it in the other choice context where their price is lower. In other words, they buy high and sell low. This shows that failure to account for variation in subjective prices — that the value of a bundle depends on the full context in which it will be experienced — is the sole source of costs and differences in behavior from narrow bracketing. When prices of all goods are constant across all contexts, a narrow bracketer behaves like a broad bracketer, thus incurs no costs, and it is impossible to identify broad from narrow bracketing. Such constant prices imply that the value function v is consistent with transitive preferences that are additive: they satisfy expected utility, have constant absolute risk aversion, and are linear in each of the goods for two or more goods.

2.1 Setup and Definitions

Domain of Choice. A consumer faces $i \geq 1$ simultaneous choices from choice sets S_i. Each option $x \in S_i$ is a bounded, random amount of $n + 1$ goods, with positive amounts for the first $n \geq 0$ goods (the consumption goods) and with real amounts for money (the $n + 1$st good).[3] So each x is a bounded random variable over $\mathbb{R}_+^n \times \mathbb{R}$, which we denote by $\mathbb{X}$.

Value function. Let S be the set of possible combined outcomes, i.e. $S = \sum_i S_i$. Then the agent derives a utility $v(x|S)$ from any final option $x \in S$. This assumes that the actual utility an agent derives stems from the final outcome x, not from how it was obtained. We assume that $v(\cdot|S)$ is continuous in x.[4] With some abuse of notation, we write m (for *money*) to denote bundles consisting only of sure amounts of money with $m \in \mathbb{R}$. We assume that v is strictly increasing in money: for any S and any $x \in S$, as we add more money to the option x, the value of x relative to all other (unchanged) alternatives in S increases, and there is some amount $\overline{m}$ s.t. the value of $x + \overline{m}$ is as high as the highest of the values of the alternatives. In other words, adding money to an option in a choice set makes it

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[3]Choices over lotteries over money correspond to $n = 0$.
[4]Formally, let $S_0 = S \setminus \{x\}$, then $v(x|S_0 \cup \{x\})$ is continuous in x.

strictly more desirable and there is some amount of money such that the person is indifferent between it and the best alternative.[5]

Narrow and Broad Bracketing. Consider a person who makes two simultaneous choices from S_1 and S_2.[6] We say that a person *brackets narrowly* if they maximize v in S_1 and S_2 separately. So they choose x_i^N from S_i satisfying $x_i^N \in \arg\max_{x \in S_i} v(x|S_i)$, and thus end up with a combined bundle $z^N = x_1^N + x_2^N$. Similarly, we say that a person *brackets broadly* if they maximize v over the combined choice set $S = S_1 + S_2$: they pick z^B satisfying $z^B \in \arg\max_{z \in S} v(z|S)$.

2.2   Cost of Bracketing and Identification

We now turn to the question of what the cost a narrow bracketer can incur when making two simultaneous choices. Concretely, we want to identify how much money a narrow bracketer might leave on the table when facing choices from $S(k)$ for $k \geq 0$, where $S(k)$ is the subset of $\mathbb{X}$ consisting of those x which have outcomes that yield an amount of at most k for each good: $S(k) = \{x \in \mathbb{X} : |x_i| \leq k \ \forall i \leq n+1\}$. We first study the case where $v(x|S) = v(x)$, so that it is choice-set independent and represents the value function of a transitive preference. Later, we allow v to depend on S, which allows for a variety of preference reversals.

Context-independent value function: $v(x|S) = v(x)$**.**   This implies that v is equivalent to some transitive preference relation $\succsim$ over outcomes, with indifference relation $\sim$. Given our assumptions, for every X and Y, there is a unique $\overline{m}$ s.t. $X + Y \sim Y + \overline{m}$. This $\overline{m}$ gives the willingness to pay for X over Y, or in other words the *subjective price of X over Y*. Thus $P(X|Y) = \overline{m}$.

However, when the choices the person makes are from $S(k)$, we are not interested in $P(X|Y)$, but the highest price $P_B(X|Y)$ for X that they can be offered in $S(k)$ such that they *buy* X — that is, they (weakly) choose $Y + X$ over $Y + P_B(X|Y)$) — and the lowest price $P_S(X|Y)$ for X that they can be offered in $S(k)$ such that they *sell* X — that is, they (weakly) choose $Y + P_S(X|Y)$. When $Y + P(X|Y) \in S(k)$, we have that $Y + P(X|Y) \sim Y + X$, hence the person is willing to buy or sell X at price $P(X|Y)$ and so $P_B(X|Y) = P_S(X|Y) = P(X|Y)$. However, when $Y + P(X|Y) \notin S(k)$, then $P(X|Y)$ cannot be offered when limiting choices to $S(k)$. Then if $P(X|Y) < 0$, the person always chooses $Y + m$ for all $Y + m \in S(k)$ and thus there is no price at which they buy X, so that $P_B(X|Y)$ is not defined. The lowest price at which they sell is given by $P_S(X|Y) = \inf\{m : Y + m \in S(k)\}$. Similarly, when $Y + P(X|Y) \notin S(k)$ and $P(X|Y) > 0$, then the person never sells X, and $P_S(X|Y)$ is not defined, while $P_S(X|Y) = \sup\{m : Y + m \in S(k)\}$.

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[5]Formally, consider any S with $x, y \in S$ and $x \neq y$. Then for any $m > 0$, we have that $v(x+m|S_m) - v(y|S_m) > v(x|S) - v(y|S)$, where $S_m = S \setminus \{x\} \cup \{x+m\}$ is the new choice set with x replaced by $x + m$. Morevoer, there is some $\overline{m}$ s.t. $v(x+\overline{m}|S_{\overline{m}}) = \max_{S \setminus \{x\}} v(y|S_{\overline{m}})$.

[6]Our definition straightforwardly generalizes to any $i > 1$.

Now suppose that we have that $p_1 = P_B(X|Y) > P_S(X|Y') = p_2$ for some $Y \neq Y'$ where P_B and P_S are defined. Then this means that the person is willing to buy X on top of Y for up to a price of p_1 and willing to sell X on top of Y' for a lower price of p_2. Thus if we offer this person these simultaneous choices, then a narrow bracketer will buy high and sell low and thus make a dominated choice. Concretely, suppose the person is offered both $S_1 = \{X + Y, Y + p_1 - \varepsilon\}$ and $S_2 = \{X + Y', Y' + p_2 + \varepsilon\}$. Then they choose $X + Y$ in the first choice and $Y' + p_2 + \varepsilon$ in the second to obtain a total of $X + Y + Y' + p_2 + \varepsilon$. But if the person flipped both their choices, they would have obtained $X + Y + + Y' + p_1 - \varepsilon$, which dominates the actual choice by a monetary amount of $p_1 - p_2 - 2\varepsilon$, so that they lose up to $p_1 - p_2$ in sure money. This leads to the following proposition:

Proposition 1. *Let $\bar{\Delta} \equiv \max_{X, Y, Y' \in S(k)} P_B(X|Y) - P_S(X|Y')$. For every $\varepsilon > 0$, there exist X, Y, and Y' such that a narrow bracketer chooses an option A when they could have chosen $A + \bar{\Delta} - \varepsilon$.*

Proof. By definition of $\bar{\Delta}$, for any ε_0, there is some sequence of X, Y, and Y' s.t. $\Delta \equiv P_B(X|Y) - P_S(X|Y') > \bar{\Delta} - \varepsilon_0$. By the argument above, we know that we can offer S_1 and S_2 s.t. the person incurs a cost of $\bar{\Delta} - \varepsilon_2$, for any ε_2. Hence if $\varepsilon_0 + \varepsilon_1 < \varepsilon$, the result holds. $\qquad\square$

Suppose first that $\bar{\Delta} > 0$. Then by the Proposition 1, we know that there are situations where a narrow bracketer makes a dominated choice, which a broad bracketer never would do. Hence we can distinguish between a narrow and a broad bracketer, which means that bracketing is identified.

If instead $\bar{\Delta} = 0$, then $P(X|Y) = P(X)$ for all X and Y. This means in particular that $P_B(X|Y) = P_S(X|Y')$ for any X, Y, and Y' in $S(k)$ where P_B and P_S are defined. But this means that there is some $P(X)$ s.t. $P_B(X|Y) = P(X) = P_S(X|Y)$ whenever these are defined. Moreover this $P(X)$ is defined for every X, since for every Y, at least one of $P_B(X|Y)$ or $P_S(X|Y)$ is defined: at a price of $m = 0$, the person either sells or buys, and $Y + 0 \in S(k)$, so one of the two needs to be defined. From this we also get that $P(X) = P(X|0)$, so $X = X + 0 \sim 0 + P(X) = P(X)$, so that $X \sim P(X)$. Then by transitivity of the preferences, we see that X is (strictly) chosen over Y if $P(X)$ is (strictly) greater than $P(Y)$ (since we assumed that more money is better). This shows that $P(X)$ is in fact a utility representation in monetary terms that rationalizes the choices of v in $S(k)$.

Furthermore, $P(X)$ is an additive utility representation, satisfying $P(X + Y) = P(X) + P(Y)$ for any X and Y. We know that $P(X + Y) \sim X + Y \sim Y + P(X|Y) \sim Y + P(X) \sim P(X) + P(Y|P(X)) = P(X) + P(Y)$. Thus we have additivity.

So we have shown that when $\bar{\Delta} > 0$, we can distinguish between narrow and broad bracketing. And when $\bar{\Delta} = 0$, then $P(X)$ is a utility representation of the preferences, which means the person chooses the bundles maximizing $P(X)$, and since it is additive, maximizing it over all choices is the same as maximizing it choice set by choice set. In other words, narrow bracketing $P(\cdot)$ is identical to broadly bracketing $P(\cdot)$.

This proves the following proposition.

Proposition 2. *We can distinguish between narrow and broad bracketing — narrow and broad bracketing are identified — if and only if $\bar{\Delta} > 0$.*

Additivity, as we show in the appendix, implies that the preferences satisfy expected utility, display constant absolute risk aversion (in case of utility over risky outcomes in money only), or are linear in case there is at least one consumption good.

Context-dependent value functions   Now let us consider context-dependent value functions, that is, value functions where the choice may depend on the choice set itself.

We can generalize the definitions of $P_B(X|Y;S)$ and $P_S(X|Y;S)$ for arbitrary situations that might affect choices. Then if $P_B(X|Y;S) > P_S(X|Y';S')$ we can generate dominated choices exactly as before. For choice set dependence, S is the choice from which the person chooses, but we can think of other types of dependence, such as framing, that is changing the presentation of the outcomes differently (bold text, pictorally vs numerically in text vs orally). Here we only consider the choice set dependence, since it is the most commonly studied departure from transitive preferences, allowing for a large variety of behaviors.

Let us define $\Delta(S, S') \equiv \max_{X \in S \cap S', Y \in S, Y' \in S'} P_B(X|Y;S) - P_S(X|Y';S')$. Then a generalization of Proposition 1 applies to context-dependent value functions, with an identical proof (omitted).

Proposition 3. *Let $\bar{\Delta} \equiv \max_{S,S' \subset S(k)} \Delta(S, S')$. Then for every $\varepsilon > 0$, there exist S, S' in $S(k)$, such that a narrow bracketer chooses an option A from $S + S'$ when they could have chosen $A + \bar{\Delta} - \varepsilon$.*

Therefore when $\bar{\Delta} > 0$, we again have identification. Note that any violation of WARP necessarily implies that $\bar{\Delta} > 0$, since any violation of WARP implies that we can change a person's willingness to pay for an option by altering the unchosen alternatives from the set. Therefore and violation of WARP generates a cost of bracketing and be used to identify bracketing.   Therefore, when $\bar{\Delta} = 0$, we must have that WARP holds, therefore we have a context-independent value function, and therefore Proposition 2 holds also in this case.

3   Experimental Design and Procedures

In this section, we describe two pre-registered online experiments[7] written in the Lioness software (Giamattei et al., 2020). We describe our main experiment (conducted in December 2019 to January 2020) that tests both narrow and broad bracketing in real effort choices. We then describe our follow-up experiment (conducted in March and August 2020) that aimed at reducing the amount of narrow bracketing.

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[7]See https://doi.org/10.1257/rct.3412-4.499999999999999, in particular the 'December Design' under *Supporting Documents and Materials*.

3.1 Task and Design of Experiment Testing Bracketing

We now describe the four parts of the primary experiment (detailed instructions in Appendix B).

Part 1: Tutorial Subjects familiarize themselves with the task by completing practice tasks until they get three tasks correctly. The tasks consist of decoding a sequence of twelve letters into numbers, as seen in Figure 1.

Encryption task

Decode sequences into numbers until you got 10 right.

Correctly decoded text sequences: 0

Decoding table

letter	u	t	f	c	g	n	v	q	a	l
corresponds to number	0	1	2	3	4	5	6	7	8	9

Text sequence: tvqqnqvgfgug

Your answer (enter only numbers):

167757642404

Submit

Figure 1: Decoding task

Every sequence is a new table showing a mapping of ten randomly chosen letters to the numbers between 0 and 9. After every attempt we generate a new table, independently of whether the answer was correct or not. We anticipated that this makes it harder for subjects to learn the task than more commonly used encryption or typing tasks (e.g. Erkal et al., 2011; De Quidt et al., 2017; De Quidt, 2018). This should increase the convexity of costs, which is our primary channel for satisfying our identifiability assumptions.

Part 2: Elicit Tediousness We elicit participants' perceived tediousness of the task on a scale from 1 ("not tedious at all") to 10 ("extremely tedious"), providing a control variable common to all treatments.

Part 3: Elicit Reservation Wages by Treatment   We elicit participants' reservation wage for a high-work option that requires 15 more tasks than the low-work option, depending on treatments. The four treatments (described below) vary participants' endowment of tasks and money and how this endowment is presented. There are two choice scenarios, with Scenario 1 always presented before Scenario 2. We elicit one reservation wage for each scenario through an incentivized price list task, where participants choose to accept or reject the extra work for a list of *extra* reservation wages between $0.25 and $4.00 in $0.25 increments. The extra wages are in addition to the $4.00 participants receive for the alternative workload.[8] The wording of the payments thus depends on the treatment (see description of Main Treatments). We tell subjects that a single binding choice from one of the two scenarios will be selected at random and implemented.

Part 4: Complete Tasks   We randomly determine the binding choice and inform subjects about the total payment and number of sequences to decode. Subjects can complete the tasks without time constraints. We then ask a short demographic questionnaire and display a summary of total earnings.

3.2   Main Treatments

In each choice scenario in our main treatments, participants make a single active choice that is possibly combined with an endowment of work and/or money. Such bracketing is sometimes called *endowment bracketing*,[9] the most studied case being when people fail to integrate background risk with other risky choices (see Barberis et al. (2006) and Mu et al. (2021a), who highlight the importance of ignoring background risk to account for risk aversion over small stakes). [10]

We have four treatments: NONE, where there is no endowment; MONEY/LOW and MONEY, where the endowment consists of $2.00; and BOTH, where the endowment consists of $2.00 and 15 sequences to decode. NONE, MONEY, and BOTH have identical total choice sets: the total amount of money and work possible is the same for these treatments. The choice of additional work and money is identical in BOTH and MONEY/LOW, but since MONEY/LOW has no endowment of work, each option in MONEY/LOW leads to exactly 15 fewer sequences than in BOTH – hence MONEY/LOW is the only treatment with different total outcomes.

Below we show the text displayed on the choice page for Scenario 1 for each treatment, as well as one choice list item. Scenario-2 choices require exactly 15 sequences more than the Scenario-1 choices of the same treatment. Participants have to choose between a list of Option A and Option B choices, with payments for Option B (in addition

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[8]Details about the individual choices for each treatment can be found in Appendix B.

[9]See (Koch and Nafziger (2019), Ellis and Freeman (2020)).

[10]Not taking into account endowments, or taking them into account only partially, may cause people to treat goods and money as less fungible than they really are. As such endowment bracketing may be related to some types of mental budgeting, such as Heath and Soll (1996); Hastings and Shapiro (2013); Abeler and Marklein (2017). Moreover, as Imas (2016) shows, people behave differently in choices over gambles after realized compared to paper losses, which shows that other factors than bracketing affects the impact of endowments on choices.

to the completion fee) going from $4.25 to $8 in steps of $0.25.[11]

NONE: No Endowment

> **By completing the HIT you will receive a total payment (which includes the $2.00 completion fee) depending on your choices.**
>
> | | | OPTION A | OPTION B | |
> |---|---|---|---|---|
> | 5) | 15 sequences for a total payment of $6.00 | ○ | ○ | 30 sequences for a total payment of $7.25 |

BOTH: Both Money and Work Endowment

> **Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.**
>
> **By completing the HIT you will receive $2.00 plus a bonus depending on your choices.**
>
> | | | OPTION A | OPTION B | |
> |---|---|---|---|---|
> | 5) | 0 additional sequences for an extra $4.00 | ○ | ○ | 15 additional sequences for an extra $5.25 |

MONEY/LOW: Money but no Work Endowment

> **By completing the HIT you will receive $2.00 plus a bonus depending on your choices.**
>
> | | | OPTION A | OPTION B | |
> |---|---|---|---|---|
> | 5) | 0 sequences for an extra of $4.00 | ○ | ○ | 15 sequences for an extra of $5.25 |

MONEY: Money but no work endowment

> **By completing the HIT you will receive $2.00 plus a bonus depending on your choices.**
>
> | | | OPTION A | OPTION B | |
> |---|---|---|---|---|
> | 5) | 30 sequences for an extra of $4.00 | ○ | ○ | 45 sequences for an extra of $5.25 |

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[11]The only additional description on the choice screen is a sentence stating "Choices to make now: for each choice in this Scenario, choose the preferred option." See Appendix B for the full choice screen and choice list.

3.3 Bracketing Hypotheses

Note that the treatments NONE and BOTH have *identical* total outcomes in the same scenario, but with 15 sequences and $2.00 shifted to the endowment for BOTH. Hence broad bracketing predicts identical choices over *total* outcomes across them.[12] MONEY/LOW on the other hand has identical Options in the choice list as BOTH, even though it has no work endowment and hence require 15 fewer tasks. So the choice options *ignoring* endowments are identical for MONEY/LOW and BOTH, so that narrow bracketing predicts identical choices of options – but not of total outcomes. Denoting by m_T the average reservation price elicited in treatment T, we get the following hypotheses:[13]

Hypothesis 1 (Broad Bracketing). *Behavior is consistent with broad bracketing if $m_{NONE} = m_{BOTH}$ in every Scenario.*

Hypothesis 2 (Narrow Bracketing). *Behavior is consistent with narrow bracketing if $m_{BOTH} = m_{MONEY/LOW}$ in every Scenario.*

As we discussed in Section 2, we can cannot always identify bracketing (that is, distinguish narrow from broad bracketing). In the case of our experiment, we need that $m_{MONEY/LOW} \neq m_{NONE}$: if $m_{MONEY/LOW} = m_{NONE}$, then choices are consistent with linear preferences, so that we will either fail to reject both narrow and broad bracketing or reject both simultaneously. This will happen if participants are as willing to do 15 additional sequences on top of 0 sequences, as they are willing to do them on top of 15 sequences.

Assumption 1 (Identification Assumption). *We can identify narrow vs broad bracketing if and only if $m_{NONE} \neq m_{MONEY/LOW}$.*

Since we have two Scenarios, we have two tests for broad and two tests for narrow bracketing. For tests with 5% significance, we would therefore apply the Bonferroni correction of rejecting the null hypothesis in a given Scenario only if m_{NONE} differs from m_{BOTH} (H_0 : broad bracketing) or from $m_{MONEY/LOW}$ (H_0 : narrow bracketing) at the 2.5%-level, to avoid overrejection based on having two tests.

While running these three treatments, we realized that since treatments NONE and BOTH differ in both money and work endowments, our test for broad bracketing will reject broad bracketing if participants bracket either money broadly but not work, or work broadly but not money. We therefore decided to add the treatment MONEY with the same total outcomes as BOTH and MONEY, but with only a money endowment. Since treatment MONEY differs from BOTH only in the endowment of work, but not in the endowment of money, broad bracketing of work predicts the same reservation wages across these treatments. And similarly, since treatment MONEY differs from NONE only in having

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[12]In a similar design in online auctions on eBay, Hossain and Morgan (2006) find higher revenues and number of bidders when the starting price is reduced by the same amount that the shipping costs are increased. This is consistent with participants ignoring shipping costs (partially), similar to ignoring endowments in our setting.

[13]One can formally relate these hypotheses to our theoretical framework by noting that situations of a single choice with a given endowment correspond to situations where the second choice set is a singleton: $\mathcal{Y} = \{Y\}$.

a money endowment, broad bracketing of money predicts the same reservation wages across these treatments. Note that this treatment was not pre-registered and run mostly in separate sessions.[14] This leads to the following hypotheses (applied at the Bonferroni-corrected level of 2.5%-significance per Scenario to account for double-testing):

Hypothesis 3 (Broad Bracketing of Work). *Behavior is consistent with broadly bracketing work if* $m_{MONEY} = m_{BOTH}$ *in every Scenario.*

Hypothesis 4 (Broad Bracketing of Money). *Behavior is consistent with broadly bracketing money if* $m_{MONEY} = m_{NONE}$ *in every Scenario.*

If Identification Assumption 1 holds, then $m_{BOTH} \neq m_{NONE}$, so broad bracketing of work and broad bracketing of money cannot both hold simultaneously.[15] To identify (i.e. distinguish between) broad bracketing of work and full narrow bracketing, we require that $m_{MONEY} = m_{BOTH}$ and $m_{BOTH} = m_{MONEY/LOW}$ cannot both hold simultaneously, i.e. if $m_{MONEY} \neq m_{MONEY/LOW}$.

Assumption 2 (Identification Assumption for Work Bracketing). *We can identify narrow vs broad bracketing of work if and only if* $m_{MONEY} \neq m_{MONEY/LOW}$.

To identify broad bracketing in money from narrow bracketing in both dimensions, we require the following:

Assumption 3 (Identification Assumption for Money Bracketing). *We can identify narrow vs broad bracketing of money if and only if* $m_{MONEY} = m_{NONE}$ *and* $m_{BOTH} = m_{MONEY/LOW}$ *do not hold simultaneously.*

3.4   Main Experiment: Randomization and Summary Statistics

We recruited in total 929 subjects on Amazon Mechanical Turk between the end of December 2019 and the beginning of February 2020. Table 7 in Appendix C shows how many participants and in which treatment we recruited by session. In Table 1 we report summary statistics across treatments. Of the subjects recruited, 162 did not complete the experiment. While differential attrition across treatments could itself hint at the consequences of narrow bracketing, we see no evidence for it (see Table 8 in Appendix C). Across all treatments, between half and two-thirds of participants failing to complete the HIT drop before completing the practice tasks, while the remaining others drop out after finding out how many tasks they have to do in total. Treatments are similar in terms of gender composition (χ^2 test p-value: 0.91), while participants are slightly older in the NONE treatment compared to other treatments (37.8 years vs 35.0-36.0, χ^2 test p-value: 0.01). Finally, individuals rate the task on average as 7.33-7.54 out of 10 in tediousness, which

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[14]Scenario 2 of MONEY/LOW is identical in all respects to Scenario 1 of MONEY, so both broad and narrow bracketing predict identical choices in the absence of sequencing effects. Choices may still differ if anchoring, reference, or comparison effects are sufficiently strong. Such effects by themselves provide no evidence for or against bracketing. Even in the presence of such effects, Scenario-1 choices are not affected by them, so they provide appropriate tests. Scenario-2 choices are appropriate tests of broad bracketing and narrow bracketing respectively, if they apply to broad or narrow bracketing of sequencing effects as well.

[15]In terms of statistical tests, we might fail to reject both, so we might lack power for identification. But in principle they are identified.

does not significantly vary across treatments (χ^2 test p-value: 0.86). Roughly 23.5% of the choices made within a choice-list are inconsistent: in a few cases subjects make only one inconsistent choice, while in other cases choices are inconsistent throughout the list of wages offered (such as when they switch repeatedly between the options, even though we monotonically increase payment). In our main analysis we drop a scenario if individuals make more than one inconsistent choices in it. To detect an effect size of 0.40 at a 5% level of significance with 90% power, we would need 174 observations in BOTH and 116 in MONEY and NONE treatments. The number of observations collected with consistent choices are above these thresholds and therefore considered sufficient for our treatments comparisons, although as the discussion on identification makes clear, the effect size decreases as preferences become more linear. Participants earned $7.30 on average, for an average working time of 35 minutes.[16]

Table 1: Summary statistics for main treatments.

	NONE	BOTH	MONEY/LOW	MONEY	p-value
Participants	200	320	196	213	
Attrition	18%	20.3%	13.3%	16.4%	0.22
Final Participants	164	255	170	178	
Share Female	0.4	0.38	0.4	0.37	0.91
Age	37.8	35	35.1	36	0.01
Tediousness	7.54	7.45	7.33	7.54	0.86
Inconsistent Choices					
Scenario 1	17%	18.8%	20.4%	22.1%	0.59
Scenario 2	15%	18.4%	18.9%	22.1%	0.33

3.5 Follow-Up Experiment Description

In our follow-up study we explored if we can reduce narrow bracketing by making the increasing costs of the additional tasks more salient through a different presentation of choices. We designed two new treatments, BEFORE and AFTER, that are identical to the BOTH treatment, except that we describe the effort choice to participants as extra sequences to decode before or after the mandatory sequences. We reasoned that thinking about doing additional tasks "after" the required ones would lead participants to think about higher marginal disutility.[17]

Concretely, we presented choices as follows: OPTION A *"0 additional sequences before (after) the 15 required for an extra $4"* versus OPTION B *"15 additional sequences before (after) the 15 required for an extra $X"* with X starting from $4.25 and up to $8. In total, 302 participants were recruited and started the HIT.[18] We report in Table 11 in Appendix C the summary statistics, compared to the earlier BOTH sessions. We observe a similar attrition rate to

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[16]Subjects' feedback rated on average this payment as generous. For details, see https://turkerview.com/requesters/A3TEY5GKYRHXWG.

[17]Note however, that these follow-up treatments were collected primarily after COVID-19 induced lockdowns had been put in place.

[18]The new study was conducted in two sessions in March and August 2020.

the other treatments. Overall, the composition of the sample in terms of demographics and perceived tediousness of the task is similar to the main treatments. However, we find more inconsistent choices.[19]

This leads to the following natural hypotheses:

Hypothesis 5 (Debiasing through highlighting required tasks alone). *Drawing attention to extra tasks reduces narrow bracketing if $m_{BEFORE} \neq m_{BOTH}$.*

Intuitively, the BEFORE phrasing might make participants realize the relevance of the required tasks. This may change their behavior, if they understand that they should add the endowment to their choice and do so.

Hypothesis 6 (Debiasing through highlighting convex cost of additional tasks). *Drawing attention to the (assumed) convexity of costs reduces narrow bracketing if $m_{AFTER} \neq m_{BOTH}$.*

Intuitively, the AFTER phrasing might make people realize that they have to do tasks 16 through 30, rather than 1 through 15, even if they do not realize that they should broadly bracket. So, if it draws attention in this way, then it should lead to a larger change away from BOTH. In both cases, full debiasing requires that the reservation wage equals NONE — or MONEY if it only debiases in the work dimension.

Unlike our main hypotheses, these hypotheses are not tightly linked to the theory, as our BEFORE and AFTER treatments need to draw sufficient attention to the endowments and the need to combine them.

4   Results

We now analyse the reservation wages across treatments: the smallest extra wage for which subjects prefer OPTION B over OPTION A, where OPTION B always requires decoding correctly 15 sequences more than OPTION A. The extra payments start at 0.25, if a subject always accepts the extra work, and increases in 0.25 increments to 4.00. If a subject never accepts the extra work, we code the reservation wage as 4.25.

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[19]These features may be explained by recent evidence about the effects of the COVID-19 pandemics on the composition of the pool of Mturkers. Moss et al. (2020) reports that the demographic composition of MTurkers did not change with the pandemics. However, Arechar and Rand (2020) find that on average Mturkers became less attentive. Our findings are in line with both studies, making us cautious about the comparability of treatments. For this reason we focus exclusively on individuals whose choices are consistent.
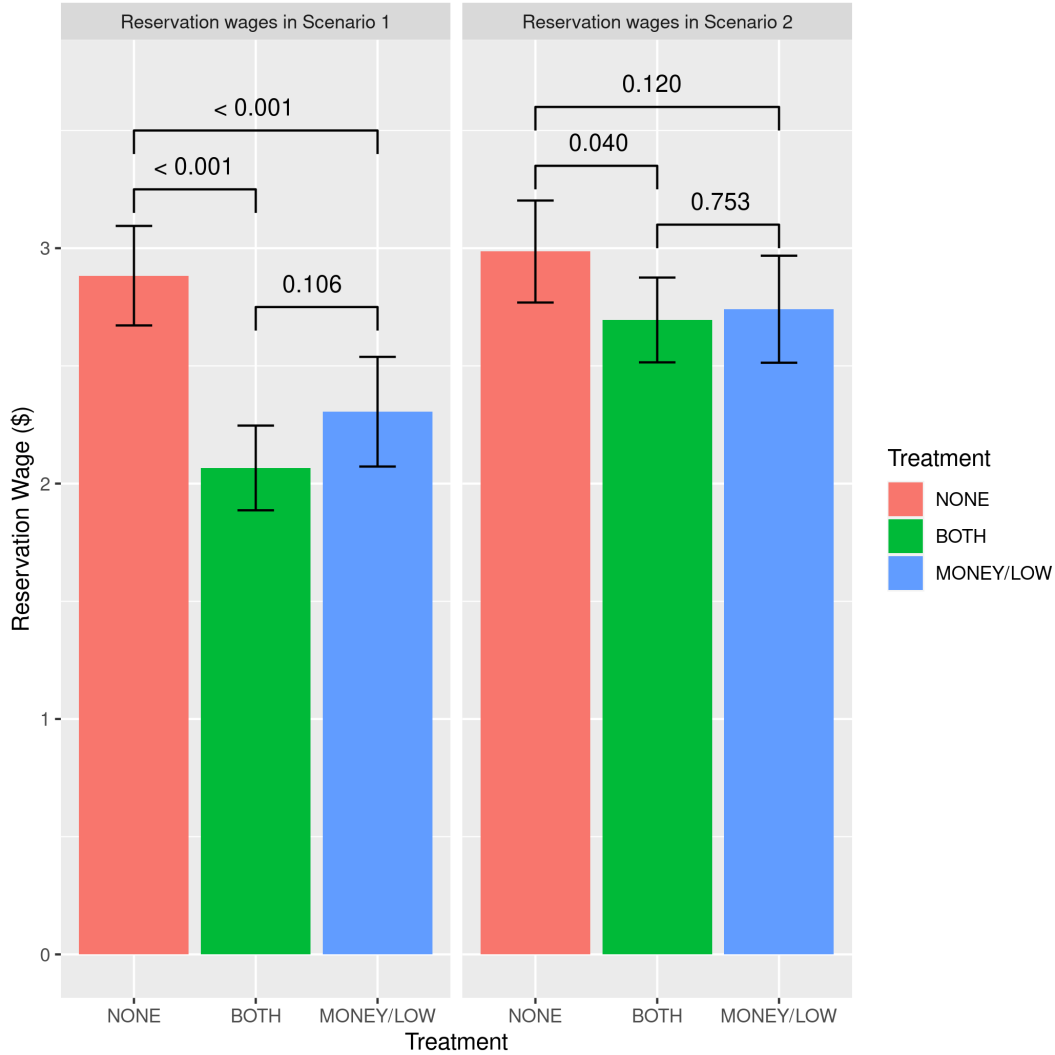
4.1 Main Results

Figure 2: The reservation wages by treatment for each of the two scenarios, along with confidence interval (2 standard errors above and below the estimate). The p-values compare average reservation wages between two treatments via two-sided t-tests.

Result 1. *We reject Hypothesis 1 that individuals bracket decisions broadly.*

Based on figure 2, we reject broad bracketing as per Hypothesis 1, since we reject broad bracketing in one of the scenarios (Scenario 1) at the Bonferroni-corrected p-value of less than 2.5%-significance (see our discussion in 3.3).[20] Concretely, the average extra reservation wage in treatment NONE in Scenario 1 is $2.88 compared to $2.07 in BOTH, and this difference is significant at the 0.001-level. Note that identifying assumption 1 holds in Scenario 1, since the reservation wage in NONE and in MONEY/LOW are not equal.[21]

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[20]See C.9 in Appendix C for bar plots and kernel density plots of the raw reservation wage data by treatment and scenario.

[21]Since we keep the choice sets exactly equal across treatments, we ensure that differences in behavior are not because of (non-bracketing)

Notice that the Scenario-2 reservation wage of $2.74 in MONEY/LOW and of $2.88 in NONE are not statistically significantly different (p-value of 0.120). Thus identifying assumption 1 fails in this Scenario, and consequently we fail to reject broad bracketing in this scenario. We also fail to reject narrow bracketing in this scenario: the reservation wage of $2.70 for BOTH is not statistically significantly different from MONEY/LOW. Scenario 2 lacks power to identify bracketing, because we cannot rule out constant marginal disutility at 15 and 30 baseline sequences.[22]

Since the difference in Scenario 1 between the reservation wage of $2.31 in MONEY/LOW and of $2.07 in BOTH is not significant (p-value: 0.106), we cannot reject narrow bracketing in either Scenario and hence do not reject it overall. Since the identification assumption holds in Scenario 1, the identification assumption holds, so the failure to reject it does not stem from a failure of the identification assumption to hold.

Result 2. *We fail to reject Hypothesis 2 that individuals bracket decisions narrowly.*

We perform similar comparisons between the treatments via Wilcoxon rank-sum tests as well as when restricting to the balanced sessions only, both of which lead to identical conclusions – see Appendix C for details.[23]

Overall, our results can be summarized by saying that participants have a disutility function $d(\cdot)$ satisfying $d(15) \approx 2.3$ (based on Scenario 1, MONEY/LOW), with $d(30) - d(15) \approx 2.8$ (based on Scenario 1, NONE; and Scenario 2, MONEY/LOW) and with $d(45) - d(30) \approx 3.00$ (based on Scenario 2, NONE); and that participants narrowly bracket these preferences. The disutility of effort is thus convex, and growing less convex with additional tasks.[24] Since identification requires non-additive preferences in general, and thus non-linear preferences for our experiment, the more convex the preferences are, the more statistical power we have to identify bracketing.

4.2 Size of reservation wage changes due to bracketing

Going beyond our pre-registration, we estimate how much the reservation wage of participants changes due to bracketing. We report these changes and their standard errors in Table 2. As we can see, the reservation wages change by as much as $0.82. We also provide the equivalent of this change in reservation wages in terms of tasks and time spent on tasks (in seconds). To do so, we use the fact that across all treatments and scenarios, the average reservation wage for 15 additional tasks is never higher than 2.99, meaning that (on average) people are willing to do an additional

interactions with work they do outside of our experiment. For example, if participants could earn less in some treatments, they might decide to spend less time on our experiment and work more on other tasks on MTurk instead. If our participants did that, it would by itself be a sign that they failed to realize that their overall outcomes are actually the same.

[22]See our discussion in 3.3 for the identifying assumption in the context of our experiment, and 2 for the general theoretical results. We also run a linear regression that averages the differences between treatments across scenarios with the same results for our main treatments. We explain in C.10 why averaging across scenarios is inappropriate.

[23]In addition to using the Wilcoxon rank-sum tests, we also perform tests for different sessions of BOTH. Specifically, in the initial sessions, we mistakenly displayed the endowments on the page right before the first choice page. We fixed this, displaying it *on* the first choice page only, which is why we collected more data for treatment BOTH. See C.6 and C.7 for the same results when we restrict treatment BOTH to when we display the endowments on the first choice page only, or when we display it right before the first choice page. See C.4 for when we restrict the treatments to those sessions in which data collection was balanced – since some sessions were not balanced. In all these cases, we reject broad bracketing in Scenario 1 at the 2.5%-level and hence overall, and do not reject narrow bracketing in either Scenario 1 or Scenario 2.

[24]The decreasing convexity may represent increasing disutility, or perception effects (focusing, framing), or most likely a mixture of both. The source of the convexity does not affect our bracketing results, since convexity itself is all we need to identify bracketing as discussed in Section 2.

Table 2: The table reports Δ, the change in reservation wages between NONE and BOTH. The highest average reservation wage for 15 more tasks is 2.99 across all treatments and scenarios, so that $2.99/15 \approx 0.20$ is an upper bound for the average cost per task. Using this, we can convert Δ into task-equivalents by $\Delta/0.20$, and the cost in time-equivalents (in seconds) by $(\Delta/0.20)/46$, since the average time taken for a task is 46 seconds. $\hat{\Delta}$ stands for $m_{NONE} - m_{MONEY/LOW}$: the change in the marginal disutility of doing 15 extra tasks on top of a low vs on top of a high baseline. Under full narrow bracketing, $\hat{\Delta}$ and Δ should be equal.

Scenario	Gender	Δ	Std.Err.	$\hat{\Delta}$	Task equivalent	Time equivalent (in secs)
Pooled						
Scenario1	Pooled	0.82	0.14	0.58	4.10	188
Scenario2	Pooled	0.29	0.14	0.25	1.46	67
Female						
Scenario1	Female	1.14	0.21	0.91	5.71	262
Scenario2	Female	0.26	0.23	0.23	1.28	59
Male						
Scenario1	Male	0.60	0.18	0.38	3.01	138
Scenario2	Male	0.32	0.18	0.30	1.61	74

task for $2.99/15 \approx \$0.20$, so that \$0.82 is equivalent to about 4 tasks. This in turn is equivalent to 3 minutes (188 seconds), given that the average time spent per task is 46 seconds.

We also report the change in reservation wages by gender based on Koch and Nafziger (2019), who state that "[w]omen seem to be more prone to narrow bracketing than men". The estimated changes range from \$0.14 (Scenario 2) to \$0.41 (Scenario 1) in the pooled data, from \$0.13 to \$0.57 for female and from \$0.16 to \$0.30 for male participants. Thus we also find that women have larger changes due to bracketing. Note however that under full narrow bracketing, since the reservation wage in BOTH should equal that in MONEY/LOW, we would expect that $\Delta := m_{NONE} - m_{BOTH} = m_{NONE} - m_{MONEY/LOW}$. Since m_{NONE} measures the marginal disutility when the baseline is 15 tasks higher than for $m_{MONEY/LOW}$, this is a measure of the convexity of disutility, and Δ is predicted to be larger the more convex the preferences are. We therefore report $\hat{\Delta} := m_{NONE} - m_{MONEY/LOW}$ in Table 2.

This shows that the results are in line with both men and women bracketing narrowly, yet women having larger changes in reservation wages due to more convex disutility from work. For women, the marginal disutility of doing 15 sequences on top of 0 sequences (elicited in Scenario 1 of MONEY/LOW) is \$0.91 higher than their marginal disutility of doing 15 sequences on top of 15 sequences (as elicited in Scenario 1 of BOTH). For men, this figure stands only at \$0.38. For both genders, we can reject broad bracketing, but not narrow bracketing (see Appendix C.1 for details). This suggests that some of the gender differences in Koch and Nafziger (2019) may be due to gender differences in preferences.

Table 3: The table reports Δ, the change in reservation wages between MONEY and BOTH. Under broad bracketing of work, Δ should be 0, see Hypothesis 3. $\hat{\Delta}$ stands for $m_{MONEY} - m_{MONEY/LOW}$. When $\hat{\Delta} = 0$, we cannot identify full narrow bracketing from broad bracketing of work.

Scenario	Gender	Δ	Std. Err.	$\hat{\Delta}$
Pooled				
Scenario1	Pooled	0.43	0.14	0.19
Scenario2	Pooled	-0.26	0.14	-0.31
Female				
Scenario1	Female	0.65	0.22	0.42
Scenario2	Female	-0.26	0.24	-0.29
Male				
Scenario1	Male	0.28	0.19	0.06
Scenario2	Male	-0.28	0.18	-0.31

4.3 Bracketing in Work and Money Dimensions Separately

Our results show that people do not bracket broadly. It is still possible that this is only due to a failure to bracket broadly their endowment of money, even though they broadly bracket their work endowment. We therefore ran an additional treatment, MONEY, in which there was only an endowment of MONEY, but no endowment of work. Thus, if participants in treatment BOTH bracketed work broadly, they should behave identically to participants in MONEY in both scenarios. Since we did not pre-register this treatment and ran it after having started our main treatments. For this reason, the participants in MONEY are not balanced by session against the other treatments. See Appendix C.2 for details.

Table 3 reports the differences in means between treatments MONEY and BOTH. The results show a sizeable and statistically significant difference in scenario 1 (p-value: 0.002), and a smaller and statistically insignificant difference for Scenario 2, similar to the main results. We thus reject that participants broadly bracket work.[25]

Result 3. *We reject Hypothesis 3 that individuals bracket the work dimension broadly.*

Regarding gender differences, we see that men's choices are consistent with broad bracketing of work, while women's choices are not. However, men's choices are also consistent with full narrow bracketing, because men's choices are consistent with linear costs, while women's choices aren't. Thus the identification assumption 2 fails for men and holds for women. Thus while it might be justified to claim that women incur larger costs than men from bracketing work, it would be wrong to claim that they are bracketing work more narrowly.

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[25]This is the only result that is not statistically significant when we instead use a linear regression that averages differences in reservation wages across scenarios – see Appendix C.10. The reason is clear from 3: in Scenario 1, the difference between BOTH and MONEY is $2.07 - 2.50 = -0.43$, while it is $2.70 - 2.43 = 0.27$ in Scenario 2, which averages out to a difference of $(-0.43 + 0.27)/2 = 0.08$ that is indistinguishable from 0. Since bracketing predicts identical behavior for each Scenario, averaging across scenarios as the linear regression does is not the appropriate test and overly conservative – both for testing broad *and* narrow bracketing.

Table 4: The table reports Δ, the change in reservation wages between MONEY and NONE. Broad bracketing of money requires $\Delta = 0$. $\hat{\Delta}$ stands for $m_{BOTH} - m_{MONEY/LOW}$. Full narrow bracketing requires $\hat{\Delta} = 0$.

Scenario	Gender	Δ	Std. Err.	$\hat{\Delta}$
Pooled				
Scenario1	Pooled	-0.38	0.15	-0.24
Scenario2	Pooled	-0.55	0.16	-0.05
Female				
Scenario1	Female	-0.49	0.24	-0.23
Scenario2	Female	-0.51	0.26	-0.03
Male				
Scenario1	Male	-0.32	0.20	-0.22
Scenario2	Male	-0.60	0.20	-0.03

Table 4 similarly shows that people do not broadly bracket money, and that both men and women bracket it narrowly.

Result 4. *We reject Hypothesis 4 that individuals bracket the money dimension broadly.*

4.4 Study 2: an Attempt to Debias

The treatments BEFORE and AFTER are identical to the BOTH treatment, except for describing additional sequences as "additional sequences before" or "additional sequences after" the 15 required tasks. Figure 3 shows the means by Scenario and by treatment. Treatements BEFORE and AFTER differ from treatment BOTH only by highlighting the number of tasks to do and labeling them as "before" or "after" the baseline tasks. In both BEFORE and AFTER the extra reservation wage is higher than in BOTH, but in both cases this difference is not statistically significant ($p - values > 0.097$). In Appendix C.6, we however show that the AFTER treatment is statistically significantly different from BOTH when we limit ourselves to those observations in BOTH that received their information about baseline on the first choice page only, which may indicate a partial success of debiasing.

Result 5. *We reject Hypothesis 5 that drawing attention to the later tasks reduces narrow bracketing.*

Result 6. *We find tentative support for Hypothesis 6 that drawing attention to convexity by highlighting earlier tasks reduces narrow bracketing.*
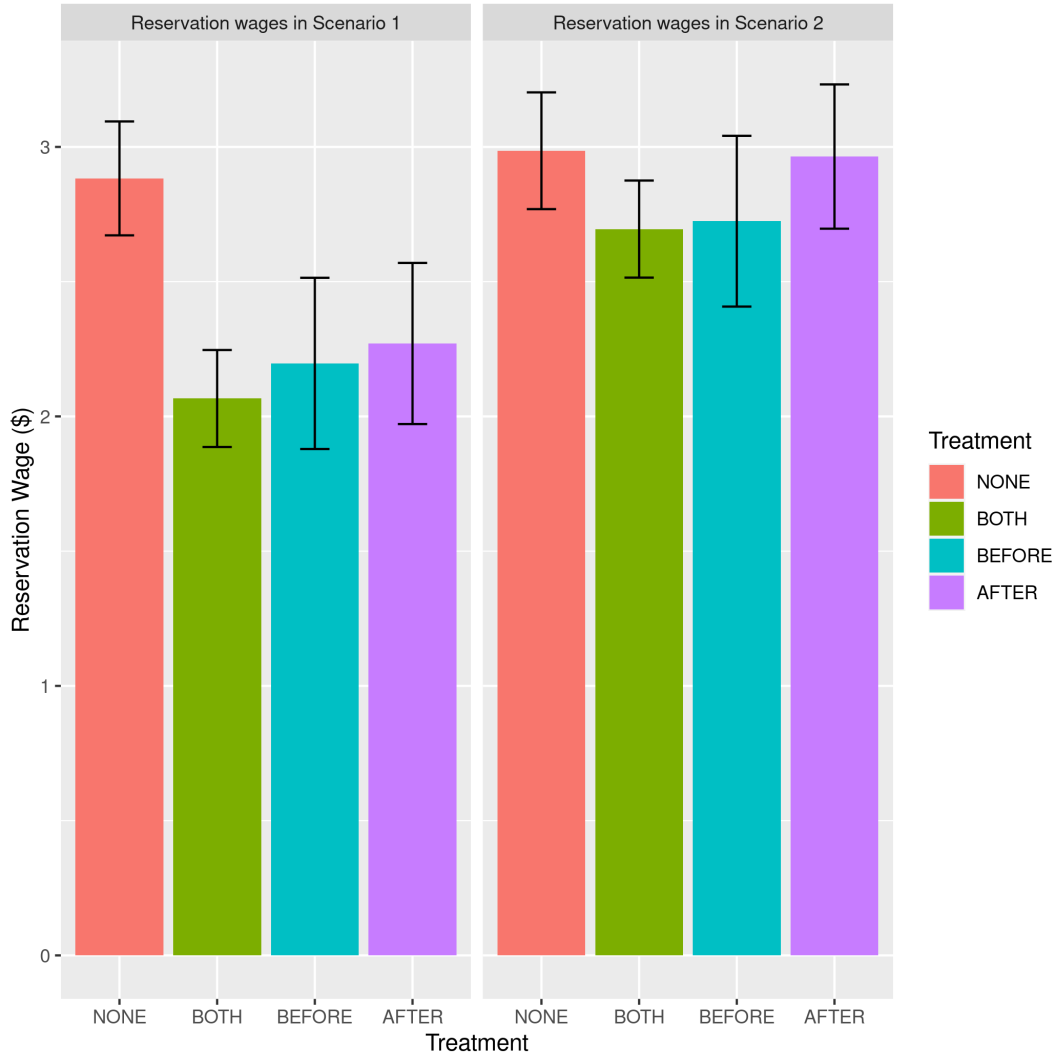
Figure 3: The reservation wages for NONE, BOTH, BEFORE, and AFTER by treatment for each of the two scenarios, along with confidence interval (2 standard errors above and below the estimate).

5 Discussion of Causes of Bracketing

In this section, we consider various mechanisms that could lead to bracketing and explain why they do not explain our results. This provides evidence of narrow bracketing as either a suboptimal mistake or possibly cognitive costs when subjects underestimate the costs from narrowly bracketing. We conclude the discussion by explaining why context-dependence and reference-dependence cannot explain, but instead interacts with, bracketing.

The literature has highlighted several causes for narrow bracketing: cognitive costs of broad bracketing; strategic concerns; preferences that depend on, or correlate with choice brackets; confusion; or unintentional mistakes.

By cognitive cost we have in mind what Handel and Schwartzstein (2018) call frictions: people realize that it

would be optimal to combine the choices, yet they decide that it isn't worth doing so given the cognitive costs they expect this would entail. This includes models of rational (in-)attention such as Lian (2021) and Kőszegi and Matějka (2020). Our results are inconsistent with the model of Lian (2021): it relies on lack of information, which we rule out by having all choice-relevant information on the choice page. Cognitive costs would have to be implausibly large for MTurkers to 'decide' that computing $15 + 15$ is too costly, unless they underestimate the potential costs: the reservation wages change by up to $0.82 or the equivalent of 3 minutes of time, which is substantially more than would be required to combine the choice sets. If cognitive costs are the reason for narrow bracketing, than either because people underestimate the costs of narrow bracketing. It is potentially consistent with people who deliberately choose to narrowly bracket across types of situations, potentially because they have decided that the cost of combining in all choices is not worth it on average, despite it sometimes being worth. This requires, however, that they have no easy way of identifying situations where they should bracket broadly, which makes such a heuristic susceptible to be miscalibrated.

Note that by keeping the information identical across all treatments (with the exception of early observations in our BOTH treatment – see the discussion in Section C.2 for details), we rule out any broadly bracketed type of reference effects, since all the information is presented in one go on the first choice page. The same applies more generally to different inference across treatments, such as inferring what their reference point should be. Even if this was the case, it can only happen if people narrowly bracket the same information that they see and, based on this, set a different reference point – for if they had bracketed all the information broadly, they would have observed and reacted to the same overall information.

Strategic concerns for bracketing have been studied primarily as a means for self-control (Koch and Nafziger (2011, 2016); Hsiaw (2018)) including in choices over effort (Koch and Nafziger (2020)). In such models, a person sets narrow goals and bears a cost from missing these goals, which can help them overcome self-control problems. While narrow goal-bracketing can lead people to respond within a given bracket, it cannot lead to different goal-bracketing in our experiment: all the possible outcomes are identical, hence then possibilities for self-control and goal-setting are also identical.

This brings us to preferences as the source of bracketing, such as the model of news utility (Kőszegi and Rabin (2009)) where people get reference-dependent utility from news about investments or gambles. If the news about a choice in one bracket is resolved separately from news in other brackets, people cannot avoid feeling the resulting news utility separately, which leads to narrow bracketing. News utility cannot explain our results, since there is a single piece of news in all treatments.

A more likely candidate for preference-based bracketing is social preferences where brackets serve as a signal of social norms or sanctions. For example, a person who is asked to split $10 between two people may split this amount equally, even if they know that one person received more money that day than the other. They may not consider it

their responsibility, their duty, or their right to affect the pre-existing income difference – and this might depend on the social context in which they are asked to make the choice. In our experiment, this would require people expecting to be treated fairly in each choice, rather than by choice plus endowment or by total experiment outcome, which seems unlikely given that people bear the full consequences. Second and more importantly, there is almost no response to the baseline workload, which would surely affect how fair participants perceive their workload to be.

One might be worried that the different wording across treatments might lead to different levels of confusion across treatments, and that such confusion could explain our results. Since participants in BOTH act as if they fully ignored their work endowment, we find this highly unlikely: why would increased confusion lead participants to put less weight rather than more weight on their endowment? If we interpret confusion as participants having higher uncertainty about actual outcomes or trusting us less, it is more plausible that act as though they face higher workloads, and hence *decrease* their willingness to work – yet we find the opposite, that they are more willing to work than participants in NONE, who have the least confusing choices, since they face no endowments. We do not observe differences in attrition at the choice stage either, which we might expect if levels of confusion were different across treatments.

By mistakes we mean anything from people not understanding that they should combine outcomes, to 'forgetting' or not realizing that they should do so in a situation – what Handel and Schwartzstein (2018) call *mental gaps*. Our study provides some of the most conclusive evidence of narrow bracketing as a suboptimal mistake or driven by cognitive costs with incorrect estimates of the costs of bracketing. While we interpret Tversky and Kahneman (1981) and related narrow bracketing over gambles as mistakes, our choices are simpler to combine than the choices in Tversky and Kahneman (1981), Rabin and Weizsäcker (2009), or Ellis and Freeman (2020). And when the choices are equally simple, it is not as easy to rule out preference-based explanations as in our case: in Redelmeier and Tversky (1992), participants may expect to find out separate choices separately, while in Exley and Kessler (2018) social preferences may depend directly on the brackets offered. Another strand of the literature explored reference dependence (and other context effects) for cab drivers. For reference dependence over daily *income* to matter, it is almost surely the case that people need to be bracketing their income narrowly, as Martin (2017) points out.[26]

Let us conclude by discussing why context effects can *never* explain bracketing. Context effects such as focusing and range effects, just like preferences, can be applied narrowly or broadly, and thus cannot provide a reason why a person is bracketing broadly or narrowly. For instance, suppose a person has context-dependent preferences such as Tversky and Simonson (1993), Kőszegi and Szeidl (2012), Bordalo et al. (2013), or Bushong et al. (2020). Consider a situation, such as our experiment, that holds full outcome sets constant, but presents them in different formats across different treatments. Then if people apply these context effects broadly, they will make identical choices across

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[26]Martin (2017) writes: "Narrow bracketing is a necessary condition for reference dependence to be relevant in daily labor supply decisions. If a driver does not consider each day in isolation, then a daily income target loses all relevance and the driver would substitute his labor across days as in the Neoclassical model." While daily income targets in money only if the person brackets money narrowly, this is not true for daily work hours targets as in Crawford and Meng (2011) for which disutility may be convex. Thus while there is thus evidence from cab drivers for narrow bracketing, most of it relates to narrow bracketing of money, rather than narrow bracketing of work choices.

these treatments. If on the other hand, they apply these context-dependent preferences narrowly, they may make different choices. Context effects and bracketing are thus complementary dimensions of how choice presentations affect decisions and that interact with each other. Proposition **??** shows that we can use the violations of WARP due to context-dependence to distinguish between narrow and broad bracketing. Barberis et al. (2006) explore this point for interactions between bracketing and non-expected utility for moderate-sized gambles.[27] Earlier papers formalized bracketing in terms of preferences (Ellis and Freeman (2020), Vorjohann (2020)), which is problematic for context effects that lead to violations of transitivity that are orthogonal to bracketing. These definitions therefore do not distinguish between violations of WARP due to context effects and violations of broad or narrow bracketing.[28] We disentangle these types of violations by defining bracketing over choice correspondences that allow for context effects to be applied either broadly or narrowly.

6 Conclusion

In this paper, we test both broad and narrow bracketing in work choices. We reject that workers on Amazon Mechanical Turk bracket broadly, since they seem to ignore required baseline tasks. We find that participants' reservation wages differ by up to $0.82 in one of our two choice scenarios – a difference of 27%. Our experiment rules out information and preferences as alternative mechanisms for our results. Conservation of cognitive resources is unlikely optimal given the size of the loss, so we consider suboptimal mistakes as the most likely driver of narrow bracketing.

Looking beyond our paper, our theoretical results suggest several ways to explore bracketing. First, our results show that WARP violations are not a nuisance, but a tool that can identify how people bracket. We showed how every violation of WARP can be used to create choices that distinguish between narrow and broad bracketing: simply provide the two choices that lead to a violation of WARP as single choices, as joint but separate choices, and as joint and combined choices. Second, our framework we can easily measure what aspects or dimensions people bracket narrowly or broadly (or neither). This allows richer types of bracketing where people bracket some, but not all, aspects broadly. In Section 4, we go one small step in this direction with our additional treatment MONEY. The treatment tests whether participants are bracketing the work dimension itself narrowly or broadly. More generally, we can identify bracketing in a certain dimension or of certain types of choices from others by separating or combining choices across these dimensions or types. Ideally this would be done at the individual level as in Ellis and Freeman (2020) to allow for different types of bracketing.

Second, while we could not reject narrow bracketing in our experiment, we believe that models of partial bracketing

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[27]For related points in choices over social preferences, see also Read et al. (1999)'s discussion of Rawlsian preferences, as well as Sobel (2005).

[28]Note that violations of broad or narrow bracketing as given by our definition also constitute violations of WARP, so we are not saying that no violation of WARP can identify violations of broad or narrow bracketing. The point is that the violations that identify behavior inconsistent with either form of bracketing take on a particular form, and that some violations of WARP are consistent with bracketing.

will be needed to make sense of choices more generally. The simplest (a-theoretical) step in this direction is to start estimating the fraction of people or the frequency of choices made by people that are bracketed narrowly or broadly.[29] Such an estimation can be done relatively straightforwardly with experimental data, by realizing that every choice provides information about the preferences of the participant over their active choice set if they are bracketing narrowly, and information about the same preferences over their total choice set if they bracket broadly. In our current design, such an estimation is too noisy, because we have too little variation in combinations of active and total choice sets to identify the many preference parameters.[30] It is however possible to design experiments to avoid this issue, which would allow a more fine-grained estimate of narrow bracketing.

7   Acknowledgements

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[29]This is different from the partial type of narrow bracketing estimated by Ellis and Freeman (2020), which assumes that each choice is made with a partial awareness of the impact of the other choice on the current decision.

[30]We have to estimate the preferences over the parameter for frequency of narrow bracketing, as well as 5 fixed effects for the 5 bundles that participants might perceive. Yet, we have only 6 different combinations of active and total choice sets, one for each treatment and scenario, so the parameters are just identified. Thus short of making assumptions on the functional form of the preferences, this will not work.

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A Appendix: Proofs

We showed in the main text that $P(\cdot)$ is additive when $\bar{\Delta} = 0$. The next Proposition formalizes what additivity implies across different choice domains.

Proposition 4. *Suppose $P(\cdot) : \mathbb{X} \to \mathbb{R}$ be an additive and continuous function. Then the following hold:*

1. *Let $\mathbb{X}$ be a space of random variables rich enough so that if $X, Y \in \mathbb{X}$, then there is some random variable A distributed uniformly on $[0,1]$ that is independent of X and Y with $\mathbb{1}(A \in (p,q)) \cdot X + \mathbb{1}(A \notin (p,q)) \cdot Y \in \mathbb{X}$ for any $p, q \in [0,1]$. Assuming that $P(X) = P(Y)$ whenever X and Y have the same distribution, $P(\cdot)$ is the certainty equivalent for an expected-utility agent*

2. *if $\mathbb{X}$ is a space of bounded real random variables, then $P(\cdot)$ is the certainty equivalent for a CARA agent*

3. *if $\mathbb{X}$ is a space of bounded and independent real random variables, then $P(\cdot)$ is a weighted average of certainty equivalents of CARA agents*

4. *if $\mathbb{X} = \mathbb{R}^n_{\geq 0}$ or $\mathbb{X} = \mathbb{R}^n$, then $P(\boldsymbol{x}) = \boldsymbol{x} \cdot \boldsymbol{\lambda}$ for some $\boldsymbol{\lambda} \in \mathbb{R}^n$ and for all $\boldsymbol{x} \in \mathbb{X}$*

Except for the first result on expected utility, results 2 through 4 have been noted in separate papers as conditions under which bracketing unidentified: Rabin and Weizsäcker (2009) assume expected utility and show that narrow bracketing incurs no cost (which is another way of stating that it is unidentified) if and only if agents have CARA preferences; Ellis and Freeman (2020) show that narrow bracketing is unidentified in multi-good choices when the utility is linear; and Mu et al. (2021b) consider additive certainty equivalents like $P(\cdot)$ and prove statement 3 above. Our contribution is to show how additivity of $P(\cdot)$ is the unifying feature behind all these results, to highlight that it implies other conditions (such as on expected utility, result 1) and that it will generalize to all other settings. We will now prove the special cases of Proposition 4.

Proof. **Case 1:** $\mathbb{X}$ is a (sufficiently rich) space of random variables

Denote by X, Y, and Z three random variables. Let A be distributed uniformly on $[0,1]$, independently of X, Y, Z and $A(p,q)$ be the event that $A \in (p,q)$. Then $\tilde{X} = \mathbb{1}(A(0,p)) \cdot X + \mathbb{1}(A(p,1)) \cdot Z$ and $\tilde{Y} = \mathbb{1}(A(0,p)) \cdot Y + \mathbb{1}(A(p,1)Z)$ are the random variables yielding the value of X respectively Y with probability p and the value of Z with probability $1 - p$.

$$
\begin{aligned}
P(\mathbb{1}(A(0, p+q) \cdot X)) &= P(\mathbb{1}(A(0,p)) \cdot X + \mathbb{1}(A(p, p+q) \cdot X) \\
&= P(\mathbb{1}(A(0,p)) \cdot X) + P(\mathbb{1}(A(p, p+q) \cdot X), \text{ by additivity} \\
&= P(\mathbb{1}(A(0,p)) \cdot X) + P(\mathbb{1}(A(0, q) \cdot X), \text{ by equal distributions}
\end{aligned}
$$

where we used the fact that $\mathbb{1}(A(0,q)) \cdot X$ and $\mathbb{1}(A(p, p+q)) \cdot X$ have the same distribution, hence also the same utility. Writing $f_X(p) = P(\mathbb{1}(A(0,p)) \cdot X)$, we have that f_X is additive, i.e. it satisfies $f_X(p+q) = f_X(p) + f_X(q)$. We assumed that it is continuous in p, hence we know that f_X is linear, i.e. $f_X(p) = \lambda p$ for some λ. Since $f_X(1) = P(X)$, we have $\lambda = P(X)$, which shows that $P(\mathbb{1}(A(0,p))X) = pP(X)$.

Let $\tilde{X} = \mathbb{1}(A(0,p)) \cdot X + \mathbb{1}(A(p,1)) \cdot Z$ and similarly for $\tilde{Y} = \mathbb{1}(A(0,p)) \cdot Y + \mathbb{1}(A(p,1)) \cdot Z$. Suppose that $X \sim Y$, so that $P(X) \geq P(Y)$. Then we have $P(\tilde{X}) = P(\mathbb{1}(A(0,p)) \cdot X) + P(\mathbb{1}(A(p,1)) \cdot Z) = pP(X) + (1-p)P(Z) \geq pP(Y) + (1-p)P(Z) = P(\mathbb{1}(A(0,p)) \cdot Y) + P(\mathbb{1}(A(p,1)) \cdot Z) = P(\tilde{Y})$. Hence $p \cdot X + (1-p) \cdot Z \sim p \cdot Y + (1-p) \cdot Z$ (the same argument applies to any event B with probability p) showing that the independence axiom holds for $\sim$. Together with continuity, this implies expected utiltiy.

Case 2: $\mathbb{X}$ is a space of bounded real random variables

From case 1 we know that we have expected utility preferences.

Now let X be any random variable and w and $w' \in \mathbb{R}$. Then $X + w$ denotes the random variable yielding w more than X. Then $P(X + w) = P(X) + P(w) \implies P(X + w) - P(w) = P(X) = P(X + w') - P(w')$. This is the certainty equivalent of X, once on top of w, once on top of w', which has to be constant for all w and w'. Hence we must have constant absolute risk aversion.

Case 3: This result follows directly from Theorem 1 in Mu et al. (2021b), since $P(\cdot)$ in this context is a monotone additive statistic over bounded real-valued random variables.

Case 4: $\mathbb{X} = \mathbb{R}^n$

Letting e_i be the unit vector in dimension i, i.e. it is the bundle that provides one unit of good i and nothing else, then we can define $f_i(x) := P(x \cdot e_i)$ for $x \in \mathbb{R}$. $f_i(x + y) = P((x + y) \cdot e_i) = P(x \cdot e_i + y \cdot e_i) = P(x \cdot e_i) + P(y \cdot e_i) = f_i(x) + f_i(y)$, so f_i is additive and continuous. It is well-known that additivity plus continuity for a function $f : \mathbb{R} \to \mathbb{R}$ implies that $f(\cdot)$ is linear.[31] Thus $f_i(x) = \lambda_i \cdot x$ for some $\lambda_i \in \mathbb{R}$. By additivity, we have that $P(\boldsymbol{x}) = P(\sum_i x_i \cdot e_i) = \sum_i P(x_i \cdot e_i) = \sum_i f_i(x_i) = \sum_i \lambda_i x_i = \boldsymbol{x} \cdot \boldsymbol{\lambda}$. $\qquad \square$

B   Appendix: Instructions

B.1   Welcome Screen

Welcome

Thank you for accepting our HIT.

During the HIT, please do not close this window or leave the HIT's web pages in any other way.

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[31]Additivity defining a function is also called Cauchy's functional equation and the stated result dates back to Cauchy.

If you do close your browser or leave the HIT, you will not be able to re-enter and we will not be able to pay you!

You will receive a baseline payment of $2.00 once you complete the HIT. Additionally, you can earn an extra bonus that will depend on your choices.

You will receive a code to enter into MTurk to collect your payment once you have finished.

Please read all instructions carefully.

B.2 Instructions

Thank you for accepting to participate in this HIT. On top of the guaranteed payment of $2.00 you will have the chance to earn an extra bonus, as explained later.

The task In this HIT you will decode several sequences of random letters into numbers with the given decoding table. For each letters sequence, the decoding table changes. The main part of the HIT will require you to decode several of these tasks.

To gain familiarity with the task you will now have to correctly decode 3 sequences. Note that each letter must be decoded correctly. After entering the decoded sequence, hit the submit button. Subsequently, irrespective of whether the text sequence was decoded correctly or not, a new sequence and decoding table will appear. Once you decode 3 sequences correctly, we describe the main part of the HIT.

Figure 4: SCREENSHOT

In the example you see the text sequence *tvqqnqvgfgug*. The decoding table tells you that u=0, t=1,... This means that you have to decode *tvqqnqvgfgug* into *167757642404* and enter this numeric value into the answer field.

B.3 Task

B.4 Main Task instructions

THE TASK

[BOTH — MONEY/LOW — MONEY] By completing the HIT you will receive $2.00. To do so you are required to decode some sequences correctly for a bonus.

We will give you two pages of choices, with 16 choices on each page. Each choice is between a low number and a high number of [additional - only in BOTH] sequences to decode before the required sequences for different bonuses.

Example Choice (DOES NOT COUNT):

- 10 **[additional - only in BOTH]** sequences for an extra $4.00

- 20 **[additional - only in BOTH]** sequences for an extra $5.00

After you made your choice the computer will select randomly one of the 16 choices from one of the 2 pages. That option will be implemented. Thus you should select your preferred option for each choice.

[NONE] To complete the HIT you will be asked to decode a certain number of sequences correctly. The number of sequences you will be required to decode will depend on your choices.

We will give you two pages of choices, with 16 choices on each page. Each choice is between a low number and a high number of sequences to decode for different amounts (which includes the $2.00 completion fee of the HIT).

- 10 sequences for a total payment of $6.00

- 20 sequences for a total payment of $7.00

After you made your choice the computer will select randomly one of the 16 choices from one of the 2 pages. That option will be implemented. Thus you should select your preferred option for each choice.

B.5   Main Task - Scenario 1

[NONE] Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive a total payment (which includes the $2.00 completion fee) depending on your choices.

		OPTION A	OPTION B	
1)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $6.25
2)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $6.50
3)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $6.75
4)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $7.00
5)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $7.25
6)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $7.50
7)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $7.75
8)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $8.00
9)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $8.25
10)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $8.50
11)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $8.75
12)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $9.00
13)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $9.25
14)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $9.50
15)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $9.75
16)	15 sequences for a total payment of $6.00	○	○	30 sequences for a total payment of $10.00

[MONEY] Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.
By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		OPTION A	OPTION B	
1)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $4.25
2)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $4.50
3)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $4.75
4)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $5.00
5)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $5.25
6)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $5.50
7)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $5.75
8)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $6.00
9)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $6.25
10)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $6.50
11)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $6.75
12)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $7.00
13)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $7.25
14)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $7.50
15)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $7.75
16)	15 sequences for an extra of $4.00	○	○	30 sequences for an extra of $8.00

[BOTH]

Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		OPTION A	OPTION B	
1)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $4.25
2)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $4.50
3)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $4.75
4)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $5.00
5)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $5.25
6)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $5.50
7)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $5.75
8)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $6.00
9)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $6.25
10)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $6.50
11)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $6.75
12)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $7.00
13)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $7.25
14)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $7.50
15)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $7.75
16)	0 additional sequences for an extra $4.00	○	○	15 additional sequences for an extra $8.00

[MONEY/LOW]

Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		OPTION A	OPTION B	
1)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $4.25
2)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $4.50
3)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $4.75
4)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $5.00
5)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $5.25
6)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $5.50
7)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $5.75
8)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $6.00
9)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $6.25
10)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $6.50
11)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $6.75
12)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $7.00
13)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $7.25
14)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $7.50
15)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $7.75
16)	0 sequences for an extra of $4.00	○	○	15 sequences for an extra of $8.00

Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		A	B	
1)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $4.2
2)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $4.5
3)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $4.7
4)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $5.0
5)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $5.2
6)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $5.5
7)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $5.7
8)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $6.0
9)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $6.2
10)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $6.5
11)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $6.7
12)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $7.0
13)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $7.2
14)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $7.5
15)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $7.7
16)	0 additional sequences before the 15 required for an extra $4.00	○	○	15 additional sequences before the 15 required for an extra $8.0

[AFTER]

Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		A	B	
1)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $4.25
2)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $4.50
3)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $4.75
4)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $5.00
5)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $5.25
6)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $5.50
7)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $5.75
8)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $6.00
9)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $6.25
10)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $6.50
11)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $6.75
12)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $7.00
13)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $7.25
14)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $7.50
15)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $7.75
16)	0 additional sequences after the 15 required for an extra $4.00	○	○	15 additional sequences after the 15 required for an extra $8.00

B.6   Main Task - Scenario 2

[NONE]

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive a total payment (which includes the $2.00 completion fee) depending on your choices.

		OPTION A	OPTION B	
1)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $6.25
2)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $6.50
3)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $6.75
4)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $7.00
5)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $7.25
6)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $7.50
7)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $7.75
8)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $8.00
9)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $8.25
10)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $8.50
11)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $8.75
12)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $9.00
13)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $9.25
14)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $9.50
15)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $9.75
16)	30 sequences for a total payment of $6.00	○	○	45 sequences for a total payment of $10.00

[MONEY]

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		OPTION A	OPTION B	
1)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $4.25
2)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $4.50
3)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $4.75
4)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $5.00
5)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $5.25
6)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $5.50
7)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $5.75
8)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $6.00
9)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $6.25
10)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $6.50
11)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $6.75
12)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $7.00
13)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $7.25
14)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $7.50
15)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $7.75
16)	30 sequences for an extra bonus of $4.00	○	○	45 sequences for an extra bonus of $8.00

[BOTH]

Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		OPTION A	OPTION B	
1)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $4.25
2)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $4.50
3)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $4.75
4)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $5.00
5)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $5.25
6)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $5.50
7)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $5.75
8)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $6.00
9)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $6.25
10)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $6.50
11)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $6.75
12)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $7.00
13)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $7.25
14)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $7.50
15)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $7.75
16)	15 additional sequences for an extra $4.00	○	○	30 additional sequences for an extra $8.00

[MONEY/LOW]

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		OPTION A	OPTION B	
1)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $4.25
2)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $4.50
3)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $4.75
4)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $5.00
5)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $5.25
6)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $5.50
7)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $5.75
8)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $6.00
9)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $6.25
115)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $6.50
11)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $6.75
12)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $7.00
13)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $7.25
14)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $7.50
15)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $7.75
16)	15 sequences for an extra bonus of $4.00	○	○	30 sequences for an extra bonus of $8.00

[BEFORE]

Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		OPTION A	OPTION B	
1)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
2)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
3)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
4)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
5)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
6)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
7)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
8)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
9)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
10)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
11)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
12)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
13)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
14)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
15)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir
16)	15 additional sequences before the 15 required for an extra $4.00	◯	◯	30 additional sequences before the 15 requir

[AFTER]

Note: you are required to decode 15 sequences correctly, in addition to the sequences based on your choices.

Choices to make now: for each choice in this Scenario, choose the preferred option.

By completing the HIT you will receive $2.00 plus a bonus depending on your choices.

		OPTION A	OPTION B	
1)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
2)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
3)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
4)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
5)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
6)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
7)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
8)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
9)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
10)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
11)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
12)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
13)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
14)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
15)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f
16)	15 additional sequences after the 15 required for an extra $4.00	◯	◯	30 additional sequences after the 15 required f

B.7   Results

[BOTH & MONEY] SUMMARY OF THE TASK

The computer randomly selected the Choice # from Scenario #.

For this option you selected that you are (are not) willing to decode # additional sequences for $X.XX.

In total you will decode # sequences to receive the HIT payment and the bonus.

[NONE & MONEY/LOW] SUMMARY OF THE TASK

The computer randomly selected the Choice # from Scenario #.

For this option you selected that you are (are not) willing to decode # sequences in total for $X.XX.

In total you will decode # sequences to receive the HIT payment and the bonus.

B.8   MAIN TASK

B.9   PAYMENT PAGE

Your earnings

In today's HIT you have earned a bonus of $.

Your guaranteed participation fee is: $2.00.

So, in total, you have earned $.

To receive your earnings, please enter this code into MTurk

After you have done that, you can close this window. We thank you for participating in our study.

Table 5: Between-treatment p-values for main treatments based on two-sided Wilcoxon rank-sum tests, treating each individual in each scenario as a single independent observation. The first two columns are for pooled data, the next two for data restricted to female participants, the final two for data restricted to male participants.

Treatments	Pooled		Female		Male	
	NONE	BOTH	NONE/F	BOTH/F	NONE/M	BOTH/M
Scenario 1						
BOTH	< 0.001		< 0.001		0.002	
MONEY/LOW	< 0.001	0.117	0.001	0.445	0.052	0.300
Scenario 2						
BOTH	0.023		0.277		0.038	
MONEY/LOW	0.108	0.704	0.357	0.984	0.121	0.809

Table 6: Between-treatment p-values for main treatments based on two-sided t-tests by scenario, treating each individual in each scenario as a single independent observation. The first two columns are for pooled data, the next two for data restricted to female participants, the final two for data restricted to male participants.

Treatments	Pooled		Female		Male	
	NONE	BOTH	NONE/F	BOTH/F	NONE/M	BOTH/M
Scenario 1						
BOTH	< 0.001		< 0.001		0.001	
MONEY/LOW	< 0.001	0.106	< 0.001	0.342	0.055	0.241
Scenario 2						
BOTH	0.040		0.264		0.072	
MONEY/LOW	0.120	0.753	0.383	0.909	0.133	0.886

C   Appendix: Additional Results

C.1   Main Results: Wilcoxon tests, tests by gender

Here we report results comparing the treatments by Wilcoxon and t-tests, running them for all participants, as well as for female and male participants separately.

C.2   Implementation Details

We collected more participants in the BOTH treatment than in other treatments, because our initial version of the BOTH treatment informed participants of their endowment on the page *before* the first choice. In later versions we informed participants of their endowment only on the first choice page to (fast) reference effects not present in other treatments, where participants saw the information only on the first choice page. For this reason we continued collecting observations in this version of BOTH until we had enough data to compare it to the other treatments, which is why we ended up with more observations in BOTH (pooling all versions) than for the other treatments. As we show in Appendix C, our results are robust to choosing the early, late, or pooled BOTH sample.

Other minor details that changed between our pre-registration and our actual implementation are that, fixing total outcomes, we only used two levels for the endowment (0 and 15 tasks) instead of three (0, 8, and 16 tasks); and that we limited ourselves to 2 scenarios per person rather than 5.

We added the treatment MONEY later to disentangle the contribution of bracketing of money and work dimensions separately. Specifically, the MONEY treatment combines all the tasks, hence differences between NONE and MONEY cannot be driven by a failure to combine work, while differences between MONEY and BOTH are direct evidence of narrow bracketing of money. To distinguish fully between the two, we should also have included a treatment that combines money but not work. This version of the MONEY treatment has the benefit that it can directly be compared to MONEY/LOW, providing additional tests of narrow bracketing.

The following table 7 shows how many participants we recruited in which treatments during sessions on different days.

Table 7: Participant numbers by sessions and treatments

Session ID	Session Date	NONE	BOTH	MONEY/LOW	MONEY
1	2019-12-18	9	9	8	0
2	2019-12-19	11	12	13	0
3	2019-12-19	39	38	40	0
4	2019-12-19	18	20	19	0
5	2019-12-20	68	0	0	0
6	2019-12-21	0	68	0	0
7	2019-12-23	0	0	61	0
8	2019-12-30	23	24	23	0
9	2020-01-21	15	13	15	43
10	2020-01-22	5	4	5	14
11	2020-01-28	12	13	12	36
12	2020-01-30	0	0	0	68
13	2020-02-04	0	0	0	52
14	2020-02-05	0	38	0	0
15	2020-02-06	0	81	0	0
		200	320	196	213

C.3 Attrition

Table 8 displays at what stage participants dropped out of the study.

Table 8: Attrition in % by a given stage

Treatments	Practice	Choice 1	Answer 1	Learn Tasks	End
Main					
NONE	11%	11%	11%	12%	18%
BOTH	11%	11%	11%	12%	20%
MONEY/LOW	9%	10%	10%	11%	13%
MONEY	8%	8%	8%	8%	16%
Follow Up					
BEFORE	7%	7%	7%	7%	18%
AFTER	7%	7%	7%	7%	14%

Table 9: Between-treatment p-values for NONE, BOTH, and MONEY/LOW treatments based on two-sided t-test, treating each individual in each scenario as a single independent observation. Restricted to sessions in which these three treatments were balanced.

Treatments	NONE	BOTH
Scenario 1		
BOTH	< 0.001	
MONEY/LOW	0.003	0.316
Scenario 2		
BOTH	0.245	
MONEY/LOW	0.222	0.936

Table 10: Between-treatment p-values for NONE, BOTH, and MONEY/LOW treatments based on two-sided Wilcoxon rank-sum tests, treating each individual in each scenario as a single independent observation. Restricted to sessions in which these three treatments were balanced.

Treatments	NONE	BOTH
Scenario 1		
BOTH	< 0.001	
MONEY/LOW	0.004	0.369
Scenario 2		
BOTH	0.270	
MONEY/LOW	0.284	0.941

C.4 Main treatments balanced data only

Since our experimental sessions were not always balanced, one possible concern might be that we get different results due to different populations across sessions. To alleviate this concern with respect to the main treatments (NONE, BOTH, and MONEY/LOW), we report here the differences in t-tests and Wilcoxon tests when restricting ourselves to the data that was collected in a balanced session – that is, data where membership was randomized and equal within each session. As the results show, we still reject broad bracketing, and fail to reject narrow bracketing.

C.5 BEFORE and AFTER summary statistics

Table 11: Summary statistics for follow-up treatments

	BOTH	**BEFORE**	**AFTER**	**p-value**
Participants	320	150	152	
Attrition	20.3%	18%	13.8%	0.23
Final Participants	255	123	131	
Share Female	0.38	0.36	0.39	0.68
Age	35	35.1	35.9	0.47
Tediousness	7.45	7.48	7.56	0.93
Inconsistent Choices				
Scenario 1	18.8%	37.3%	33.6%	0
Scenario 2	18.4%	35.3%	34.9%	0

Table 12: Between-treatment p-values for main treatments based on two-sided t-test, treating each individual in each scenario as a single independent observation. Restricted to those sessions of BOTH where baseline is revealed only on first choice page.

Treatments	NONE	BOTH
Scenario 1		
BOTH	< 0.001	
MONEY/LOW	< 0.001	0.106
Scenario 2		
BOTH	0.006	
MONEY/LOW	0.120	0.162

Table 13: Between-treatment p-values for BOTH, BEFORE, AFTER, and NONE treatments based on two-sided t-tests, treating each individual in each scenario as a single independent observation. Restricted to sessions of BOTH when the endowment is mentioned on choice page first.

Treatments	BOTH	BEFORE	AFTER
Scenario 1			
BEFORE	0.373		
AFTER	0.202	0.735	
NONE	< 0.001	< 0.001	0.001
Scenario 2			
BEFORE	0.263		
AFTER	0.015	0.249	
NONE	0.006	0.175	0.901

C.6 Baseline Tasks revealed on the choice page only

Here we report the results when we restrict the data from treatment BOTH to those sessions where the baseline endowment is only revealed on the first choice page, rather than on the page right before, as was inadvertently the case for early sessions.

Broad bracketing is rejected as before, narrow bracketing is still not rejected.

Now BOTH and AFTER are statistically significantly different in this case, as indicated by Table 13. However, the issues around the different sample population for BEFORE/AFTER remain, given that we collected most of the data after COVID-19 induced lockdowns.

Table 14: Between-treatment p-values for main treatments based on two-sided t-test, treating each individual in each scenario as a single independent observation. Restricted to those sessions of BOTH where baseline is revealed right before the first choice page.

Treatments	NONE	BOTH
Scenario 1		
BOTH	< 0.001	
MONEY/LOW	< 0.001	0.243
Scenario 2		
BOTH	0.400	
MONEY/LOW	0.120	0.490

Table 15: Between-treatment p-values for BOTH when information on baseline is presented for the first time right before the first choice or exactly on the first choice page. Based on two-sided Wilcoxon rank-sum tests, treating each individual in each scenario as a single independent observation.

Scenarios	t-test
Scenario 1	0.551
Scenario 2	0.001

C.7 Baseline Tasks revealed right before the choice page only

Next we report results from the initial BOTH treatments where the information was displayed on the page right before. The results are essentially the same, although there is no longer a statistically significant difference in scenario 2, since BOTH lies between MONEY/LOW and NONE and is not significantly different from either, reflecting the lower power due to closer to 'linear' preferences in Scenario 2 (the difference between MONEY/LOW and NONE is lower).

We compare the means of BOTH treatments with message displayed before the first choice page and on the first choice page by scenario directly in Table 15. This shows that for scenario 2, these two versions are significantly (and sizeably) different, reflecting also that in one case this leads to rejection of broad bracketing in scenario 2 and once it doesn't. No matter which is the accurate treatment, both reject broad bracketing, and neither rejects narrow bracketing.

There are two possible reasons for the difference: either it is due to the display of information, in which case the later data with information display on the page is the appropriate test, rejecting broad in both scenarios. In this case, the treatments BOTH and NONE are not balanced within sessions, since we had completed collection of data on NONE (mostly at least, we have a small overlap between the treatments). Or it is due to changes in the population due to sampling at different times. In this case the earlier data is the appropriate test, and balances observations against the NONE treatment – i.e. the rejection of broad bracketing cannot be due (or more correctly, is statistically unlikely to be due) to different preferences.

Table 16: Average individual-level change in reservation wage, conditional on whether the jump was up or down.

Treatment	Down	Up
NONE	-1.10	0.83
BOTH	-0.83	1.07
MONEY/LOW	-0.69	0.94
MONEY	-1.10	0.93

Table 17: Frequencies (in %) of individuals who switch up, switch down, or stay at the same reservation wage from scenario 1 to scenario 2. The final column reports how many more people switch up rather than down.

Treatment	Down	Stay	Up	Drop out	Up - Down
NONE	16	44	34	6	18
BOTH	6	27	60	8	54
MONEY/LOW	10	38	49	4	39
MONEY	30	42	26	2	-4

C.8 Individual-level changes in reservation wage between scenarios

Frequencies of individuals who switched up, down, or stayed, and size of jumps by switching up or down.

C.9 Plots of reservation wages by treatment

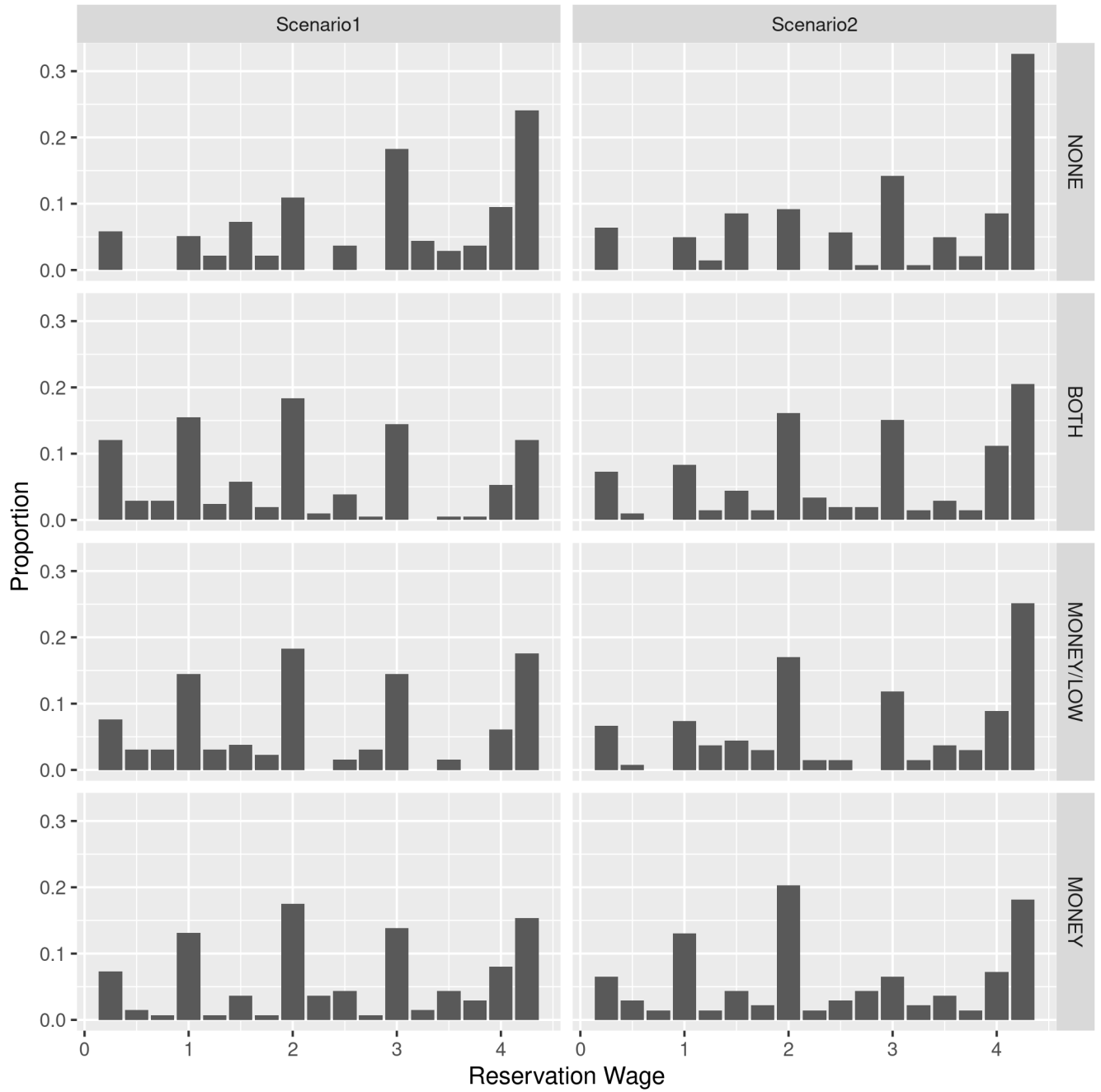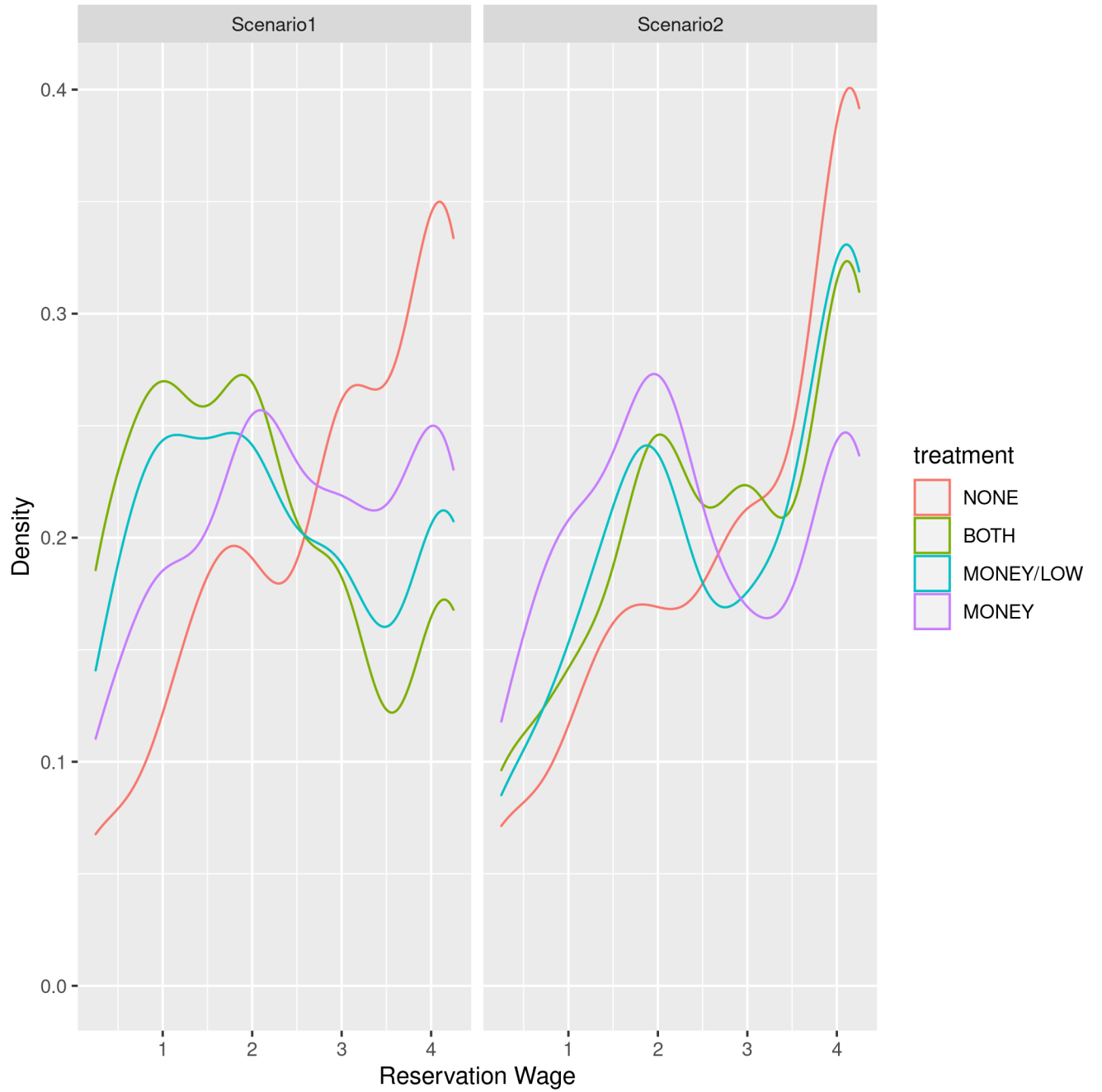Figure 5: A bar plot of the raw reservation wages by treatment and scenario

Figure 6: A kernel density plot of the raw reservation wages by treatment and scenario

C.10 Linear Regression Results

In our pre-registration, we stated that we would use a linear regression that averages across the scenarios to test for bracketing, whether broad or narrow. This is however not the appropriate test, since bracketing should apply for each Scenario separately, not just for the average scenario, which is why those are the tests we use instead. This is best illustrated via an actual example we have in our data. We report the linear regression results in 18, which rejects broad bracketing overall; fails to reject narrow bracketing; and rejects broad bracketing of money alone. It does not however reject broad bracketing of work alone, since the treatment effects for MONEY and BOTH are -0.47 and -0.55 respectively with standard errors of around 0.11, so they are not different.

Table 18: Linear Regressions of reservation wages by treatment averaged across scenarios. With and without clustered standard errors by participant. The default treatment is NONE, so that broad bracketing predicts a null estimate for the fixed effect for BOTH (rejected), and narrow bracketing predicts equal fixed effects for BOTH and MONEY/FALSE (not rejected). Broad bracketing of money (but not necessarily work) predicts a null estimate for MONEY (rejected); broad bracketing of work (but not necessarily money) predicts equal fixed effects for BOTH and MONEY (not rejected). The last-mentioned test is not rejected because the difference is positive in Scenario 1 and negative in Scenario 2, which is average in this regression. Since bracketing makes predictions that should hold for every scenario, the test in our main text is the better test (accounting for double-testing).

	Dependent variable:	
	Reservation wage	
	No clustering	Clustering by participant
	(1)	(2)
scenarioScenario2	0.31	0.31
	(0.07)	(0.04)
treatmentBOTH	−0.55	−0.55
	(0.10)	(0.13)
treatmentMONEY/LOW	−0.41	−0.41
	(0.11)	(0.15)
treatmentMONEY	−0.47	−0.47
	(0.11)	(0.14)
Constant	2.78	2.78
	(0.09)	(0.10)
Observations	1,231	1,231
R^2	0.04	0.04
F Statistic (df = 4; 1226)	12.62	12.62
Note:	Standard errors in parentheses.	

But, as the results from 19 shows, this is because the treatment effect in Scenario 1 is substantially smaller for BOTH than for MONEY (2.07 vs 2.50); yet in Scenario 2, it is substantially larger for BOTH than for MONEY

Table 19: Mean comparisons between NONE, MONEY, and BOTH

Scenario	Treatment	Mean	N	Std. Err.
Scenario1	BOTH	2.07	208	0.09
Scenario2	BOTH	2.70	206	0.09
Scenario1	NONE	2.88	137	0.11
Scenario2	NONE	2.99	141	0.11
Scenario1	MONEY	2.50	137	0.11
Scenario2	MONEY	2.43	138	0.11

(2.70 vs 2.43) which averages out to a statistically insignificant difference of 0.08 when averaged across scenarios. Since narrow and broad bracketing make predictions for every choice decision, their predictions hold for each scenario individually, thus the linear regression is not the appropriate test and overly conservative.

The fact that the reservation wage in MONEY stays the same across the two scenarios is consistent with participants bracketing all their endowments narrowly: the reservation wage for NONE is also almost constant, 2.88 in Scenario 1 vs 2.99 in Scenario 2 (see 20). Our data suggests that doing 15 more tasks is equally unpleasant when one has to do 15 tasks or 30 tasks, both in treatments NONE and MONEY. The lower reservation wage in MONEY reflects the fact that MONEY has an endowment of money. If they ignore it and have concave utility from money, then for the same experienced disutility of work, they should be more willing to work for money in MONEY than in NONE. In the latter, they take into account that their wealth is higher.

Table 20: Means of main treatments by scenario

Treatment	Res. Wage	Std Err	% upper bound	N
Scenario 1				
NONE	2.88	0.11	24%	137
BOTH	2.07	0.09	12%	207
MONEY/LOW	2.31	0.12	18%	131
Scenario 2				
NONE	2.99	0.11	33%	141
BOTH	2.70	0.09	20%	205
MONEY/LOW	2.74	0.11	25%	135