DOSE and other Loss Aversion Measures: Student Sample

Colin Camerer   **Jonathan Chapman**
Erik Snowberg   **Stephanie Wang**

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I   Useful Global Definitions

This is survey is an abbreviated version of the "WTA/P and DOSE Rehash" (CAIT0015). Module numbering is kept consistent for ease of programming, the major difference is the removal of few modules, and some changes to the intro text.

The survey will be distributed in the same manner as CAIT0012—the authors will distribute the survey themselves using personalized links.

Sections that have some changes compared to CAIT0015 are:

- Section II.A (similar to CAIT0012)

- Section II.B (similar to CAIT0012)

- Section IV (particularly revised survey ordering)

- Section III.O (changed locations of questions, and some questions removed)

- A new set of demographic questions are listed in Section III.X.

The following modules no longer appear in the survey: III.L, III.U.

All other sections are the same as in CAIT0015. This includes: III.A, III.D, III.E, III.M, III.Q, III.R, III.V, III.W

I.A   Payments

Payments to respondents will be in points. The exchange rate is roughly 1 point = \$0.001. For more on payment information, see IV.A.

I.B   Adaptive Procedure

An adaptive procedure determines a list of binary choice questions where each choice leads to a different further choice. These question trees will be generated beforehand by us. The adaptive procedure we will use is called DOSE. DOSE will only be used as an elicitation procedure in III.A and III.W.

I.C   Design Principles

Once we identified a number of traits that we wanted to elicit, we used four design principles to decide how to elicit them. In particular, we looked for ways that would:

1. Be implementable on a survey,

2. Be implementable cross-culturally,

3. Avoid correlated measurement error across traits, and

4. Take steps to minimize measurement error within a trait.

These were listed in order of importance. So, for example, if a way of measuring a trait was proposed that would reduce correlated measurement error between that trait and another, but it was not implementable cross-culturally, then this proposed way would not be used.

Some examples of how this was used follow.

1. When deciding on measures of time discount (or time inconsistency) we rejected those that would require the survey taker to log in again at some point in the future (principle 1).

2. When looking for intelligence measures, we focused on those that could be measured using questions that relied on graphical representations (principle 2).

3. When deciding between different ambiguity aversion measures, we chose one that would not require us to first estimate risk-aversion, as errors in our elicitation of risk-aversion would then be correlated with errors in our elicitation of ambiguity aversion (principle 3).

4. When eliciting the WTP–WTA gap, we separated the questions for WTP and WTA so as not to introduce measurement error caused by a consistency bias (principle 4).

5. When eliciting a trait we did so twice, as this would reduce measurement error within a trait by instrumenting (principle 4).

I.D Multiple Price List

Many of the modules will use a **M**ultiple **P**rice **L**ist (MPL) to determine the certainty equivalent of a lottery. This is a series of questions presented simultaneously with the choices in two columns. Each question asks the respondent if they would like one item or the other. One column of these questions always contains the same answer (say, a monetary amount), while the other varies (for example, lotteries with different probabilities of payoff). These require some training on the part of respondents, and may also require some additional work to code up properly.

Figure 1: An Example of Using MPL to elicit a certainty equivalent

Now consider a lottery that has a 50% chance of paying $5, and a 50% chance of paying $0. Would you rather have?

☒ Lottery or	☐	$0 dollars?
☐ Lottery or	☐	$1.50 dollars?
☐ Lottery or	☐	$2.00 dollars?
☐ Lottery or	☐	$2.50 dollars?
☐ Lottery or	☐	$2.65 dollars?
☐ Lottery or	☐	$2.80 dollars?
☐ Lottery or	☐	$2.95 dollars?
☐ Lottery or	☐	$3.10 dollars?
☐ Lottery or	☐	$3.35 dollars?
☐ Lottery or	☐	$3.50 dollars?
☐ Lottery or	☒	$5.00 dollars?

For an example of an MPL, see Figure 1. This example is constructed to elicit the certainty equivalent for a 50/50 lottery over $5 and $0. For this to be incentive compatible, the respondent will be told that should question be (randomly) selected to be paid, then one of the lines will be chosen (randomly), and they will get the choice from that line. For more on incentives, see IV.A.

Other things of note are that the top right and bottom left boxes are already filled in. This is because no one should want to buy the lottery for more than $5, or less than $0, and also because filling in these top and bottom boxes has been shown to prevent multiple cross-overs. That is, if this is used correctly by a respondent, the responses on the right will be filled in up to some point, above which only boxes to the left will be filled in. For

example, if someone had a certainty equivalent of $2.10, then the bottom 6 boxes on the left should be filled in, and the top 5 boxes on the right should be filled in.

If there is some other pattern than the one described above, then this would have multiple cross-overs, and we wouldn't be able to determine the respondent's certainty equivalent. To prevent this, we suggest a couple things. First, there should be some sort of brief training before the first MPL. Second, there should be an auto-complete feature, such that once a cross over has been made (say by ticking the bottom 4 right boxes, and then the left box for the 5th from the bottom), then a button could be pushed to fill in the rest of the boxes. Third, if a respondent tries to move forward with anything other than a single cross-over pattern (or all boxes on one side or the other ticked), then they should be given an error message and be asked to try again.

The error messages that will be given will be graphical and demonstrate the "correct" pattern that we are looking for. There will be two error messages. The first, in Figure 2, should be displayed if the respondent tries to autofill or advance without specifying a single-crossover. This will usually occur because they have left a "gap" somewhere by not filling in a box in one of the rows between the last time they checked a box on the left side and the first time they checked a box on the right side. (It can also occur if they don't check any boxes on one of those sides.)

Figure 2: Error message if there is not enough information
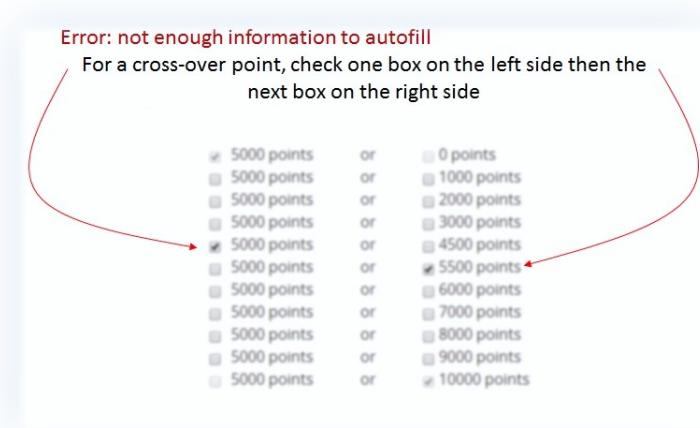
The second error message is displayed in Figure 3. This one should be used when there are multiple crossovers, that is, when the respondent picks a box on the left-hand-side below checking one on the right-hand-side. (Note that the "sides" may be reversed in some places when the options are ascending. This can happen in Section III.E and Section ??, and is noted there.) Once again, this error can be given if they try to advance or autofill without the proper configuration.

Note further that the spacing between options on the right are irregular. This is done to make sure that we are 1) covering the full range of values, while 2) emphasizing discrimination

Figure 3: Error message for multiple cross-overs
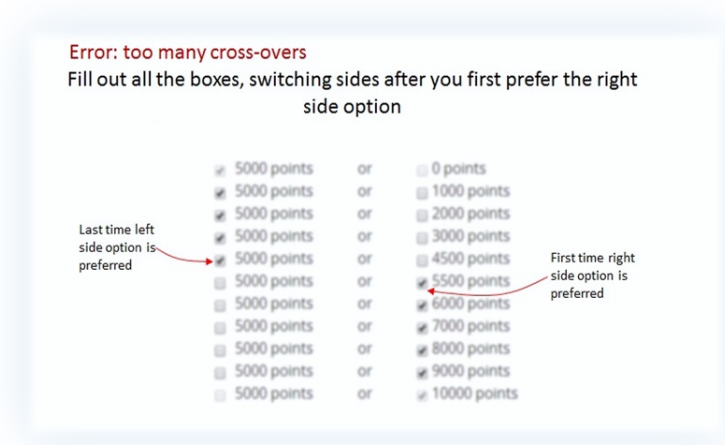
in the range where respondent's values are likely to lie, and 3) being as parsimonious as possible. In the example above we would be able to tell that the respondent's certainty equivalent lay somewhere between $2.05 and $2.20, while if we used regular intervals we would either have a wider range of possible values, more questions, or both.

Finally, there should be a "hover" link at the bottom of the page (above the forward arrow button) that gives shortened instructions in case the respondent becomes confused. The exact text of those instructions is the same as some of the training, described in Section II.D.

I.E   Payment

Payment for an MPL is straightforward: if a question containing an MPL is selected for payment, then a row is selected at random from amongst the rows in the MPL, and the respondent is paid according to their choices.

Using Figure 1 as an example, suppose that Row 3 has been randomly selected for payment, and the respondent chose "Lottery" in that row. Then the lottery would be run, and the respondent would be paid according to the outcome (which would be a 50% chance of 0, or a 50% chance of $5). As another example, suppose instead that Row 7 was chosen for payment, and in that row the respondent had selected "$2.95 dollars". Then the respondent would be paid $2.95.

II   Prelude to the Survey

II.A   Recruitment and Consent Form

Participants will be recruited by the authors from participant pools of university economics labs. We will send a recruiting email asking interested parties to express their interest, tell us

their name, school, etc. Qualified participants will be sent a unique link, which the authors will distribute. YouGov will pay participants through a Visa gift card.

When a participant clicks on the link they should be taken to a consent form, with text as follows:

We invite you to participate in a research study. You will be asked to answer a series of questions, and make choices between sure payments and lotteries.

You will be paid $3 for completing the survey. In addition, you may earn up to $30 depending on the choices you make and luck. So you may earn up to $33 in total for participating in the study. The payment will be delivered to you as a Visa e-card that will be sent to your email address. We will collect your email address at the end of the survey.

If you have read this form and have decided to participate in this experiment, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. You have the right to refuse to do particular tasks. Your individual privacy will be maintained in all published and written data resulting from the study. You may print this form for your records.

CONTACT INFORMATION: If you have any questions, concerns or complaints about this research study, its procedures, risks and benefits, you should contact Stephanie Wang at 408-888-0397 or at swwang@pitt.edu.

You may contact the Human Subjects Protection Advocate at the University of Pittsburgh Institutional Review Board at 1-866-212-2668 if you have questions about your rights as a research subject.

1. Please confirm that you are between 18 and 65 years of age, and agree to participate in this study:

    a. Yes, I am between 18 and 65 years of age, and agree to participate [→ proceed to survey]

    b. No, I am not eligible, or do not wish, to participate [→ bring them to a "Thank you for your help with our research" page and disable link]

II.B   Instructions CHANGED

Instructions should reflect standard experimental instructions. This has been updated to reflect the fact that participants will need to know what points are. Also, quantities need to be correct in both the instructions and in the attention quiz.

This study is paid in points, with **1,000 points** equalling **$1**. At the end of the survey you will be told how many points you earned, and these will be converted

into a Visa giftcard, redeemable at thousands of internet shopping sites. Please allow up to two weeks for processing of your Visa giftcard.

[add text below, up to next square bracket, when the respondent clicks forward]

If you read these instructions carefully and make good decisions **you may earn up to 33,000 points** by the end of the survey. **Please pay close attention,** as you will need to correctly answer a few questions about these instructions.

[add text below, up to next square bracket, when the respondent clicks forward]

During the survey, you will be asked a number of questions that ask you to **choose between different types of lotteries and payments**. At the end of the survey, **one** of these questions will be selected randomly, and your answer to that question will determine how many points you earn.

[add text below, up to next square bracket, when the respondent clicks forward]

For example, suppose your earnings were determined, in part, by a question that asked you to decide between

- a lottery that gave a 50% chance of 10,000 points and a 50% chance of 0 points, and
- a fixed amount of 1,000 points.

If you chose the lottery, then it would be run, and you would get **either** 0 or 10,000 points, each with 50% probability. **If you chose 1,000 points,** then 1,000 points would be directly credited to your account.

Thus, the points you earn will depend on **both** your choices and luck.

[add text below, up to next square bracket, when the respondent clicks forward]

Some sections will **start you with a fixed number of points**, say 5,000, and choices in that section will have the possibility of a loss from that total.

For example, suppose your earnings were determined, in part, by a question that asked you to decide between

- a lottery that gave a 50% chance of losing 3,000 points and a 50% chance of gaining 5,000 points, and
- a loss of 1,000 points.

If you chose the first option, and the lottery selected the loss of 3,000 points, then you would receive $5,000 - 3,000 = 2,000$ points if this question were chosen for payment. **If the lottery selected the gain**, you would receive $5,000 + 5,000 = 10,000$ points. **If you chose the second option**, then you would receive $5,000 - 1,000 = 4,000$ points if this question were chosen for payment.

[add text below, up to next square bracket, when the respondent clicks forward]

In addition to the points earned for your choices, you will earn **3,000** points for completing the survey. Thus, the **minimum** number of points you will earn for

taking this survey is **3,000**. The **maximum is 33,000**. The **average is 15,000**. You will not earn points unless you complete the survey.

The study will take you between 20 and 25 minutes. The study pays more than normal online tasks because we want you to pay close attention the entire time.

II.C   Attention Quiz

After reading the instructions respondents should be asked a series of questions. Failure to get all of them correct should send them back to the instruction screen with a note at the top stating: "You did not correctly answer all questions about the instructions. Please read them closely again." This should repeat until the respondent gets all questions correct. The questions are:

1. At the end of the survey, how many questions will be randomly selected so that points will be allocated according to your answers? [multiple choice, 1–5, correct answer is 1]

2. Your payment for this survey will depend on i. luck, ii. your choices, iii. your choices and luck, iv. none of the above? [correct answer is iii.]

3. Suppose you were given 5,000 points at the start of a module, and chose an option with a sure loss of 2,000 points in a question in that module. How many points would you end the module with if that question were chosen for payment? i. -2,000 ii. 0 iii. 2,000, iv. 3,000 v. 5,000? [correct answer is iv.]

4. How long will the survey take? i) Between 10 and 15 minutes, ii) between 20 and 25 minutes, iii) about 45 minutes, iv) one hour [correct answer is ii]

5. What is the maximum number of points you can earn for taking this survey? i. 3,000, ii. 13,000, iii. 23,000, iv. 33,000, v. 43,000? [correct answer is iv.]

II.D   MPL Training

This describes a training that we would like all respondents to go through before beginning the survey. In addition, the text from below "[next page]" to the beginning of the "Example Question" should be available as a "Help" link at the bottom of the page, as described in Section I.D.

This survey often uses a special type of question. We want to help you answer these questions **quickly** and **accurately**.

This special type of question has many similar choices, as in the example below. The options on the left are always the same, while those on the right change— getting better and better.

If a question like this is picked for payment, **one row** will be selected, and you will be paid according to the choice **you made in that row**. It is important that your answers in each row **are accurate** so you will get the payment **you want**.

You will see a screen that looks like this.

[example figure here—should just be a miniaturized screen shot of the MPL on the next screen]

[next page]

To answer these types of questions **quickly** and **accurately** we suggest you:

1. Start by looking at the **top row**, and think carefully about each row in turn.

2. For each row where you **prefer the option on the left** over the option on the right, check the box on the left hand side.

3. When you find the **first question where you prefer the option on the right** over the option on the left, check the box on the right.

4. Notice that the option on the right is always better as you go down the list. This means that after you choose one option on the right, you should choose the option on the right for all rows below. Your answers should therefore "cross over" from left to right **only once**.

5. Once you have filled in the "cross over" point you may hit the Autofill button to fill in the rest of the chart faster. Alternatively, you may check every box manually.

All rows must have a box checked for you to continue to the next page.

If you need to start over at any point, hit the **Reset** button to clear out all of the checkmarks.

1. Example Question: For each row in the table below, which option would you prefer? [MPL here]

   a. 5,000 points OR

   b. x points

[For values of

   $x \in \{0, 1000, 2000, 3000, 4500, 5500, 6000, 7000, 8000, 9000, 10000\}$.]

[Error checking here should not only consider the format, but in addition, it should ensure that the crossover is between 4500 and 5500. As in any other MPL, any errors in filling it out should return them to the MPL with the same boxes filled out, and a detailed error message.]

Note that if the respondent does not properly answer (that is, provide an answer with the crossover between 4500 and 5500), then the following error message should appear:

You have indicated in row YYY that you prefer ZZZ points to 5000 points. But ZZZ points is less than 5,000 points, which means you would get more by selecting 5000 points. Please correct this.

In all the other questions on this survey, there is no right or wrong answer. However, you should make sure that you select the option that you prefer on **each line**.

The error should fill in the YYY and ZZZ above with a line that they answered incorrectly.

III   What we Would Like to Measure and How

III.A   Risk- and Loss-Aversion, and Time Preferences

This module comes directly from CAIT0015 (amended from the initial implementation in CAIT0005).

These parameters will be jointly estimated by asking subjects to choose between lotteries over gains and loses and a certain outcome. The lotteries will be determined using an adaptive procedure (BROAD) to optimally fit the functional forms of $x^{-\rho}$ for gains and $-\lambda(-x)^{-\rho}$ for losses. The number of lotteries will be chosen to result in a certain standard error for the parameters ρ and λ. No lottery will contain a payout or loss greater than 10,000 points. For more on the level of incentives, see II.B and IV.A.

Before starting these questions, respondents will be given an introductory blurb

In the next few questions, you will be asked to choose between two lotteries.

You will start this section with 10,000 points, which you may lose based on the lotteries you choose in this section. That is, lotteries in this section may either **add** to or **subtract** from this initial 10,000 points.

For example, suppose you chose a lottery that had a 50% chance of adding 5,000 points, and a 50% chance of subtracting 5,000 points. In the case of winning, the 5,000 will be added to your additional 10,000. In the case of a loss, the 5,000 will be subtracted from your initial 10,000. Note that you will never have the possibility of losing more than 10,000, so at worst you will end this section with 0 points.

After hitting the forward button, they will be moved to the questions. Some example questions are:

1. Which of the following options do you prefer?

a. A lottery where you may receive 7,000 points, or lose 5,000 points, each with 50% probability,

OR

b. Receiving 0 points for certain.

2. Which of the following options do you prefer?

a. A lottery where you may receive 7,000 points, or receive 0 points, each with 50% probability,

OR

b. Receiving 3,000 points for certain.

Note above that if the amount in a lottery, or certain payoff, is 0 points this should be presented as "receive 0 points".

As a matter of implementation, these lotteries will be given to YouGov as a complete tree. This will come in the form of a spreadsheet where each row contains the question number, the size of the gain, the size of the loss, the size of the sure thing, the question the respondent should be directed to if they answer A, and the question the respondent should be directed to if they answer B. So, for the example above, this would be specified as a row containing something like 1, 7000, 5000, 1000, 2, 3. Note that if question n is answered, then the question the respondent should be directed to if they answer A is $2n$, and if they answer B the question the respondent should be directed to is $2n + 1$.

When the respondent reaches a question at the end of the tree, this will be in the file as a row with a question number, NA for all fields except subsequent questions, and 0 in each subsequent section column.

Note that as different "branches" will have different lengths, the data should be passed back to us in a format that has something like:

riskQuestion1, riskQuestion1choice, riskQuestion2, riskQuestion2choice, . . . , riskQuestionMAX, riskQuestionMAXchoice, finalRiskQuestion

where MAX is the maximum length of a branch in the tree, and if a respondent goes down a branch that has less than MAX choices, then the question numbers they never answer should contain missing data indicators. Note that the last question number that the respondent is confronted with will not have a choice associated (it will be a terminal, or "leaf", node). The number of this "question" should go in the field finalQuestion.

If one of the above questions is selected for payment, 10,000 points should be added to the payoff of the lottery (or sure amount) chosen by the respondent.

III.D   Endowment Effect: WTA

This module is identical to the implementation in CAIT0015.

Subjects will be given a lottery, and we will then determine how much we would need to pay them to give it up. Certainty equivalents will then be elicited using an MPL.

This section asks you two questions where you will be given a lottery and have the opportunity to sell it.

[next page]

1. For this question, you are given a lottery ticket that has a **50% chance** of paying you **9,000 points**, and a **50% chance** of paying you **1,000 points**.

   You have two options for this lottery ticket:

   1. Keep it or

   2. Sell it for a certain amount of points (for example, 3,000 points)

   [Present respondents with an MPL.]

   For each row in the table below, which option would you prefer?

   a. The lottery ticket OR

   b. Sell it for x points

[where x will take the values of

$$x \in \{0, 1000, 2000, 2500, 3000, 3250, 3500, 3750, 4000, 4250, 4500, 4750, 5000,$$
$$5250, 5500, 6000, 7000, 8000, 9000, 10000\}.]$$

2. For this question, you are given a lottery ticket that has a **50% chance** of paying you **8,000 points**, and a **50% chance** of paying you **2,000 points**.

   You have two options for this lottery ticket:

   1. Keep it or

   2. Sell it for a certain amount of points (for example, 3,000 points)

   [Present respondents with an MPL.]

   For each row in the table below, which option would you prefer?

   a. The lottery ticket OR

   b. Sell it for x points

[where x will take the values of

$$x \in \{1500, 2000, 2500, 3000, 3250, 3500, 3750, 4000, 4250, 4500, 4750, 5000,$$
$$5250, 5500, 6000, 7000, 8000, 9000\}.]$$

For Question 1 if the respondent preferred to sell the lottery for 1,000 points in the second row, the following error message should be displayed:

You indicated in the second row that you would sell the lottery ticket, which is guaranteed to pay at least 1,000 points, but possibly more, for 1,000 points. Are you sure this is what you want?

In the same question if the respondent preferred not to sell the lottery for 9,000 points (in the second to last row) the following error message should be displayed:

You indicated in the second-to-last row that you would prefer not to sell the lottery ticket, which pays at most 9,000 points, but possibly less, for 9,000 points. Are you sure this is what you want?

Below each error message should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether EITHER OF these messages were triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

For Question 2 if the respondent preferred to sell the lottery for 2,000 points in the second row, the following error message should be displayed:

You indicated in the second row that you would sell the lottery ticket, which is guaranteed to pay at least 2,000 points, but possibly more, for 2,000 points. Are you sure this is what you want?

In the same question if the respondent preferred not to sell the lottery for 8,000 points (in the second to last row) the following error message should be displayed:

You indicated in the second-to-last row that you would prefer not to sell the lottery ticket, which pays at most 8,000 points, but possibly less, for 8,000 points. Are you sure this is what you want?

Below each error message should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether EITHER OF these messages were triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

III.E   ADDED BACK: Endowment Effect: WTP

This module is identical to the implementation in CAIT0015.

Changes here are to the value of the lotteries and the MPLs. We have also added dominated-option warning messages.

This is the opposite of WTA: respondents will be given a fixed amount (say 10,000 points), and then we will determine the certainty equivalent for the lotteries in WTA, above. Note that in order to be as consistent as possible, the MPL options on the right-hand-column (the purchase price of the lottery) should be descending, rather than ascending.

This section asks you two questions where you will be given a stock of points that you can use to purchase a lottery ticket.

[next page]

1. For this question, you **have been given 10,000 points**. You will be offered the opportunity to exchange some of these points for a lottery ticket. This lottery ticket has a **50% chance** of paying you **9,000 points**, and a **50% chance** of paying **1,000 points**.

   For example, if you choose to pay 2,000 points for a lottery ticket, and this question is chosen for payment, you will:

   - Pay 2,000 points for the lottery ticket
   - Keep 8,000 points for yourself
   - Earn whatever proceeds you get from the lottery ticket (if any)

   [Present respondents with an MPL.]

   For each row in the table below, which option would you prefer?

   a. Keep 10,000 points OR

   b. Buy the lottery ticket for $10,000 - x$ points and keep the remaining x

   [where x will take the values of

   $$x \in \{0, 1000, 2000, 3000, 4000, 4500, 4750, 5000, 5250, 5500, 5750, 6000, 6250, 6500,$$
   $$6750, 7000, 7500, 8000, 9000, 10000\}.$$

   Note that the options for the purchase price should be descending (and the remainder ascending).]

2. For this question, you **have been given 9,000 points**. You will be offered the opportunity to exchange some of these points for a lottery ticket. This lottery ticket has a **50% chance** of paying you **8,000 points**, and a 50% chance of paying **2,000 points**.

   For example, if you choose to pay 3,000 points for a lottery ticket, and this question is chosen for payment, you will:

   - Pay 3,000 points for the lottery ticket
   - Keep 6,000 points for yourself
   - Earn whatever proceeds you get from the lottery ticket (if any)

   [Present respondents with an MPL.]

   For each row in the table below, which option would you prefer?

   a. Keep 9,000 points OR

   b. Buy the lottery ticket for $9,000 - x$ points and keep the remaining x

[where x will take the values of

$$x \in \{0, 1000, 2000, 3000, 3500, 3750, 4000, 4250, 4500, 4750, 5000, 5250, 5500,$$
$$5750, 6000, 6500, 7000, 7500\}.$$

Note that the options for the purchase price should be descending (and the remainder ascending).]

For Question 1 if the respondent indicated he wanted to buy the lottery for 9,000 points in the second row, the following error message should be displayed:

> You indicated in the second row that you would buy the lottery ticket, which pays at most 9,000 points, but possibly less, for 9,000 points. Are you sure this is what you want?

In the same question if the respondent prefers to keep the points rather than buy the lottery for 1,000 points (in the second to last row) the following error message should be displayed:

> You indicated in the second-to-last row that you would prefer to keep all your points rather than pay 1,000 points for the lottery ticket, which is guaranteed to pay at least 1,000 points, but possibly more. Are you sure this is what you want?

Below each error message should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether EITHER OF these messages were triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

For Question 2 if the respondent indicated he wanted to buy the lottery for 8,000 points in the second row, the following error message should be displayed:

> You indicated in the second row that you would buy the lottery ticket, which pays at most 8,000 points, but possibly less, for ,000 points. Are you sure this is what you want?8

In the same question if the respondent prefers to keep the points rather than buy the lottery for 2,000 points (in the second to last row) the following error message should be displayed:

> You indicated in the second-to-last row that you would prefer to keep all your points rather than pay 2,000 points for the lottery ticket, which is guaranteed to pay at least 2,000 points, but possibly more. Are you sure this is what you want?

Below each error message should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether EITHER OF these messages were triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

III.L   REMOVED: IQ

This module will no longer be included in the survey.

III.M   Cognitive Reflection Test

This module is identical to CAIT0015.

Questions in this section come from Fredrick, "Cognitive Reflection and Decision Making".

In this section we ask you three simple arithmetic questions.

[next page]

1. A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?

   ____ cents [allow only numbers between 0 and 100]

   [next page]

2. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

   ____ minutes [allow only numbers between 0 and 1000]

   [next page]

3. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

   ____ days [allow only numbers between 0 and 48]

III.O   CHANGED: Qualitative Questions

There are two sets of changes from CAIT0015 here. First, we have REMOVED some qualitative questions. Second, the location of some questions has been changed, particularly when prior modules have been deleted.

We will use qualitative questions to provide breaks between technically demanding MPLs. Each qualitative question below is assigned to a particular spot in a particular module, and should be placed as specified (below) within that module. Each question should be on its own page. The qualitative questions are collected in this section, rather than added directly into the sections where they will appear, to keep them logically separated.

All qualitative questions, except as noted, come from "An Experimentally Validated Preference Survey Module" by Falk, Becker, Dohmen, Huffman, and Sunde.

III.O.1   REMOVED: Risk

This question is not included in the survey (or in CAIT0015).

III.O.2   REMOVED: Time

This question is not included in the survey (or in CAIT0015).

III.O.3 Trust

This question should be placed at the end of Section III.A.

How well does the following statement describe you as a person?

"As long as I am not convinced otherwise I always assume that people have only the best intentions."

[The question should be followed by clickable horizontal boxes with the numbers 0 through 10 in them. To the left of 0 should be the text "does not describe me at all", and to the right of 10 should be the text, "describes me perfectly"'.]

This question should be placed at the end of Section III.W.

Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?

1. Most people can be trusted

2. Can't be too careful

This question is from the General Social Survey (GSS), and used in "Measuring Trust" by Glaeser, Laibson, Scheinkman, and Soutter.

III.O.4 CHANGED: Altruism

The position of this question has changed.
This question should be placed at the end of Section III.V.

How would you assess your willingness to share with others without expecting anything in return, for example your willingness to give to charity?

[The question should be followed by clickable horizontal boxes with the numbers 0 through 10 in them. To the left of 0 should be the text "completely unwilling to share with others", and to the right of 10 should be the text, "very willing to share with others"'.]

III.O.5 Positive Reciprocity

This question should be placed at the end of Section III.R.

How would you assess your willingness to return a favor to a stranger?

[The question should be followed by clickable horizontal boxes with the numbers 0 through 10 in them. To the left of 0 should be the text "completely unwilling to return a favor", and to the right of 10 should be the text, "very willing to return a favor"'.]

III.O.6 REMOVED: Negative Reciprocity

This question does not appear in the survey (or in CAIT0015).

III.O.7 CHANGED: Subjective Wellbeing

The location of the second question has now changed.

Both of these subjective wellbeing questions come from Annex B of
http://www.oecd.org/statistics/Guidelines%20on%20Measuring%20Subjective%20Well-being.pdf

The first question should go at the end of Section III.D:

> The following question asks how satisfied you feel, on a scale from 0 to 10. Zero (0) means you feel "not at all satisfied" and 10 means you feel "completely satisfied".
>
> Overall, how satisfied are you with life as a whole these days? [text box that only accepts numbers between 0 and 10]

This question should be placed at the end of Section III.E.

> Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you.
>
> On which step of the ladder would you say you personally feel you stand at this time? [text box that only accepts numbers between 0 and 10]

III.O.8 REMOVED: Qualitative Questions on Financial Shocks

This module no longer appears in the survey.

III.O.9 Attention Screener 1

This series of questions should go after the attention quiz. It is listed as such in the question ordering specification in Section IV.B.

These questions should appear on a grid. Across the top should be the question, "People spend their time doing different things. Over the last year, how frequently have you done each of these activities?" Immediately below this should be a list of choices running left to right: "Never", "Less than once a month", "About once a month", "Once a week", "More than once a week". Each of the below questions then should have a row of radio buttons that can be selected by each one. Here are the questions:

1. Ridden a bus or subway

2. Flown on an airplane

3. Been to the gym

4. Traveled to the moon

5. Gone to the grocery store

6. Read a book

7. Cooked dinner

8. Given birth

9. Gone to a religious service

10. Gotten a haircut

III.O.10 Attention Screener 2

The location of this question is specified in Section IV.B.

People like many different colors. What about you? To demonstrate that you are reading this question, please select purple and yellow from the list below. That's right, just select these two options, no matter what your favorite color is.

[Allow respondents to select as many of the below options as they would like]

- Blue
- Red
- Green
- Purple
- Black
- Orange
- Yellow
- Gold

III.O.11 Attention Screener 3

These question should go towards the end of the survey. Its exact placement is specified in Section IV.B.

We'd like to know how you feel about local news coverage. Please read this short article. On the next page, we will ask you a few questions about your reactions to this article.

MAN ARRESTED FOR STRING OF BANK THEFTS

Columbus Police have arrested a man they say gave his driver's license to a teller at a bank he was robbing.

According to court documents, Bryan Simon is accused of robbing four Central Ohio banks between October 3 and November 5, 2018.

During a robbery on November 5 at the Huntington Bank, the sheriff's office says Simon was tricked into giving the teller his drivers' license.

According to court documents, Simon approached the counter and presented a demand note for money that said "I have a gun." The teller gave Simon about $500, which he took.

Documents say Simon then told the teller he wanted more money. The teller told him a driver's license was required to use the machine to get out more cash. Simon reportedly then gave the teller his license to swipe through the machine and then left the bank with about $1,000 in additional cash, but without his ID.

Detectives arrested him later that day at the address listed on his ID.

[Next Page, do not allow participants to go back. All questions should appear on one page.]

1. Do you think this article is typical of local news coverage?

    - Yes

    - Maybe

    - No

2. Do you think there is too much coverage of crime in local newspapers?

    - Yes

    - Maybe

    - No

3. How was Simon identified by police for the crime he allegedly committed?

    - A police officer recognized him

    - From video surveillance

    - Because he left his ID

    - He turned himself in

    - None of the above

4. How much money did Simon allegedly steal?

    - About $500

    - About $1,500

    - About $25,000

- About $1 million dollars
- None of the above

III.O.12   REMOVED: Qualitative Questions on Gambling

This module no longer appears in the survey.

III.Q   Risk Aversion 2

This module is unchanged from CAIT0015.

In the next two questions, you will be asked to choose between a lottery and fixed amounts of points.

1. For each row in the table below, which option would you prefer?

    a. A 50% chance of 5,000 points, and a 50% chance of 0 points OR

    b. x points

    [for values of

    $$x \in \{-500, 0, 500, 1000, 1250, 1500, 1750, 2000, 2250, 2500, 2750, 3000, 3250,$$
    $$3500, 3750, 4000, 4500, 5000, 5500\}.]$$

    [next page]

2. For each row in the table below, which option would you prefer?

    a. A 50% chance of 4,000 points, and a 50% chance of 1,000 points OR

    b. x points

    [for values of

    $$x \in \{600, 1000, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000, 3200,$$
    $$3400, 3600, 4000, 4600\}.]$$

For Question 1 if the respondent chooses 0 points in the second row, the following error message should be displayed:

You indicated in the second row that you would prefer 0 points over the lottery, which is guaranteed to pay at least 0 points, but possibly more. Are you sure this is what you want?

In the same question if the respondent choses the lottery over 5,000 (in the second-to-last row) points the following error message should be displayed:

You indicated in the second-to-last row that you would prefer the lottery, which pays at most 5,000 points, but possibly less, to 5,000 points for sure. Are you sure this is what you want?

Below each error message should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether EITHER OF these messages were triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

For Question 2 if the respondent chooses 1,000 points in the second row, the following error message should be displayed:

You indicated in the second row that you would prefer 1,000 points over the lottery, which is guaranteed to pay at least 1,000 points, but possibly more. Are you sure this is what you want?

In the same question if the respondent choses the lottery over 4,000 (in the second-to-last row) points the following error message should be displayed:

You indicated in the second-to-last row that you would prefer the lottery, which pays at most 4,000 points, but possibly less, to 4,000 points for sure. Are you sure this is what you want?

Below each error message should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether EITHER OF these messages were triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

III.R   Loss Aversion

This module is unchanged from CAIT0015.

For these questions, the negative and positive options in the MPL should be expressed differently. If the point amount given in x is, for example, -3000 points, then this should be shown as "Losing 3,000 points", whereas if it is 3000, it should be shown as "Gaining 3,000" points. 0 should be expressed as "0 points".

Before starting these questions, respondents will be given an introductory blurb.

In the next few questions, you will be asked to choose between a lottery and fixed amounts of points.

You will start this section with 5,000 points, which you may lose based on the lotteries you choose in this section. That is, the lotteries in this section may either **add** to or **subtract** from this initial 5,000 points.

For example, suppose you chose a lottery that had a 50% chance of adding 5,000 points, and a 50% chance of losing 5,000 points. If the lottery pays 5,000 points, these will be added to your initial 5,000 points, giving you a total of 10,000 points. If the lottery chooses a loss of 5,000 points, this will be subtracted from your initial 5,000 points, so you will not receive any points. Note that you will

never have the possibility of losing more than 5,000, so at worst you will end this section with 0 points.

[next page]

1. For each row in the table below, which option would you prefer?

   a. A 50% chance of gaining 5,000 points, and a 50% chance of losing $5,000$ points OR

   b. [Losing / gaining] x points

   [for values of

   $$x \in \{-6000, -5000, -4000, -3000, -2500, -2000, -1750, -1500, -1250,$$
   $$-1000, -750, -500, -250, 0, 250, 500, 1000, 3000, 5000, 7000\}.]$$

   [next page]

2. For each row in the table below, which option would you prefer?

   a. A 50% chance of gaining 4,000 points, and a 50% chance of losing $4,000$ points OR

   b. [Losing / gaining] x points

   [for values of

   $$x \in \{-5000, -4000, -3000, -2500, -2000, -1750, -1500, -1250,$$
   $$-1000, -750, -500, -250, 0, 250, 500, 1000, 2000, 3000, 4000, 5000\}.]$$

For Question 1 if the respondent chooses $-5,000$ points in the second row, the following error message should be displayed:

> You indicated in the second row that you would prefer to lose 5,000 points over the lottery, which induces a loss of at most 5,000 points, but possibly less. Are you sure this is what you want?

In the same question if the respondent chooses the lottery over 5,000 (in the second-to-last row) points the following error message should be displayed:

> You indicated in the second-to-last row that you would prefer the lottery, which pays at most 5,000 points, but possibly less, to a gain of 5,000 points for sure. Are you sure this is what you want?

Below each error message should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether EITHER OF

these messages were triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

For Question 2 if the respondent chooses $-4,000$ points in the second row, the following error message should be displayed:

> You indicated in the second row that you would prefer to lose 4,000 points over the lottery, which induces a loss of at most 4,000 points, but possibly less. Are you sure this is what you want?

In the same question if the respondent chooses the lottery over 4,000 (in the second-to-last row) points the following error message should be displayed:

> You indicated in the second-to-last row that you would prefer the lottery, which pays at most 4,000 points, but possibly less, to a gain of 4,000 points for sure. Are you sure this is what you want?

Below each error message should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether EITHER OF these messages were triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

III.U   REMOVED: Risk over Losses

This module no longer appears in the survey.

III.V   Mixed Risk

This module is unchanged from CAIT0015.

Note that for these questions, only the lower-right box should be ticked automatically (and not the upper left).

For these questions, the negative and positive options in the MPL should be expressed differently. If the point amount given in x is, for example, -3000 points, then this should be shown as "Losing 3,000 points", whereas if it is 3000, it should be shown as "Gaining 3,000" points. 0 should be expressed as "0 points".

> In the next few questions, you will be asked to choose between a lottery and 0 points.
>
> You will start this section with 10,000 points, which you may lose based on the lotteries you choose in this section. That is, lotteries in this section may either **add** to or **subtract** from this initial 10,000 points.
>
> For example, suppose you chose a lottery that had a 50% chance of losing 3,000 points, and a 50% chance of gaining 5,000 over 0 points for sure. If the lottery pays you 5,000 points, this will be added to the 10,000 points you already have, and you will finish this section with 15,000 points. If the lottery chooses a loss of 3,000 points, this will be subtracted from your initial 10,000 points, so you will

end up with 7,000 points. Note that you will never have the possibility of losing more than 10,000, so at worst you will end this section with 0 points.

[next page]

1. For each row in the table below, which option would you prefer?

   a. 0 points OR

   b. A 50% chance of [losing / gaining] x points, and a 50% chance of gaining 5,000 points

   [for values of

   $x \in \{-10,000, -9000, -8000, -7000, -6500, -6000, -5500, -5000, -4500,$
   $-4000, -3500, -3000, -2500, -2000, -1500, -1000, 0, 1000\}.$

   [next page]

2. For each row in the table below, which option would you prefer?

   a. 0 points OR

   b. A 50% chance of [losing / gaining] x points, and a 50% chance of gaining 4,000 points

   [for values of

   $x \in \{-10,000, -9000, -8000, -7000, -6500, -6000, -5500, -5000, -4500,$
   $-4000, -3500, -3000, -2500, -2000, -1500, -1000, 0, 1000\}.$

For each question above, there will be an additional error message that should appear if the respondent checks a dominated option.

For Question 1 if the respondent chooses the sure amount in the second-to-last row, the following error message should be displayed:

> You indicated in the second-to-last row that you prefer a sure amount of 0 over a lottery that pays at least 0 and may pay more. Are you sure this is what you want?

Below this error should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether this message was triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

For Question 2 if the respondent chooses the lottery in the second row, the following error message should be displayed:

You indicated in the second-to-last row that you prefer a sure amount of 0 over a lottery that pays at least 0 and may pay more. Are you sure this is what you want?

Below this error should be two buttons "Yes. Continue" and "No. Go back and change my answers." For each respondent a variable should indicate whether this message was triggered. This variable should take on values of 0 or 1 (or "no" and "yes").

III.W   Additional Adaptive Questions

This module is unchanged from CAIT0015.

The module is based on that found in Section III.A. The main modifications from a programming point of view are:

- There is an added question format (which is essentially the same as the first format, but with only losses instead of gains),

- The order of options in the existing format is switched,

- Some of the wording in existing options is changed, and

- The endowment (initial allotment of points) is increased to 15,000.

In addition, a randomly chosen 50% of participants should be given a screen that says simply "You are almost halfway done with this section. You will now be asked some more questions with a choice between a lottery and an amount of points for certain." (with a button for next) after the 8th choice (out of 20). The remaining half should see this screen after the 12th choice. The final dataset should contain a variable identifying the position the screen appeared in.

Before starting these questions, respondents will be given an introductory blurb:

In the next few questions, you will be asked to choose between two lotteries.

You will start this section with 15,000 points, which you may lose based on the choices you make. That is, lotteries in this section may either **add** to or **subtract** from this initial 15,000 points.

For example, suppose you chose a lottery that had a 50% chance of gaining 5,000 points, and a 50% chance of losing 5,000 points. In the case of a gain, the 5,000 will be added to your initial 15,000. In the case of a loss, the 5,000 will be subtracted from your initial 15,000. Note that you will never have the possibility of losing more than 15,000, so at worst you will end this section with 0 points.

After hitting the forward button, they will be moved to the questions. Some example questions are:

1. Which of the following options do you prefer?

   a. Receiving 0 points for certain,

   OR

b. A lottery where you may gain 7,000 points, or lose 5,000 points, each with 50% probability.

2. Which of the following options do you prefer?

a. Gaining 3,000 points for certain,

OR

b. A lottery where you may gain 7,000 points, or receive 0 points, each with 50% probability.

3. Which of the following options do you prefer?

a. Losing 3,000 points for certain,

OR

b. A lottery where you may lose 7,000 points, or receive 0 points, each with 50% probability.

Note above that if the amount in a lottery, or certain payoff, is 0 points this should be presented as "receive 0 points".

As a matter of implementation, these lotteries will be given to YouGov as a complete tree. This will come in the form of a spreadsheet where each row contains the question number, the size of the first lottery payoff, the size of the second lottery payoff, the size of the sure thing, the question the respondent should be directed to if they answer A, and the question the respondent should be directed to if they answer B. So, for the first example above, this would be specified as a row containing something like 1, 7000, 5000, 0, 2, 3. Note that if question n is answered, then the question the respondent should be directed to if they answer A is $2n$, and if they answer B the question the respondent should be directed to is $2n + 1$.

Note that this Section adds the possibility that a sure thing may be a loss, or that a lottery will not contain a gain, which was not possible before. Losses will be denoted by negative numbers, whereas before they were denoted only by position. Code must be updated to reflect these changes, and adapt wording accordingly.

When the respondent reaches a question at the end of the tree, this will be in the file as a row with a question number, NA for all fields except subsequent questions, and 0 in each subsequent section column.

Note that as different "branches" will have different lengths, the data should be passed back to us in a format that has something like:

riskQuestion1, riskQuestion1choice, riskQuestion2, riskQuestion2choice, . . . , riskQuestionMAX, riskQuestionMAXchoice, finalRiskQuestion

where MAX is the maximum length of a branch in the tree, and if a respondent goes down a branch that has less than MAX choices, then the question numbers they never answer should

contain missing data indicators. Note that the last question number that the respondent is confronted with will not have a choice associated (it will be a terminal, or "leaf", node). The number of this "question" should go in the field finalQuestion.

If one of the above questions is selected for payment, 15,000 points should be added to the payoff of the lottery (or sure amount) chosen by the respondent.

III.X NEW: Demographic Questions

We will need some specific demographics for data cleaning and payment. We'll use YouGov's standard question wording for the following:

- Name

- email address (for payment)

- Gender

- Age (or year of birth)

In addition, we will need the following information:

1. Which of the following best describes your current educational situation?

   a. I am enrolled as an undergraduate student in a college or university

   b. I am enrolled as a graduate student in a college or university

   c. I am not currently enrolled as an undergraduate or graduate student in a college or university

   [If the participant answers a. or b. above, please follow up with the following two questions]

2. What college or university are you enrolled in? [text box allowing up to 50 characters]

3. What is your field of study?

   a. Humanities

   b. Social Sciences

   c. Science or Mathematics

   d. Fine Arts

    e. Professional (Business, Law, Medicine, etc.)

4. How often do you participate in incentivized studies like this one (online or in an economics or psychology lab)?

    a. This is my first one

    b. I participate less than once a year

    c. I participate a few times a year

    d. I participate at least once a month

IV   Implementation Issues

IV.A   Incentives

Points will be converted into monetary amounts at a rate of 1 point=$0.001. A basic description of how incentives will actually be provided are in II.B, above.

The respondent should be shown a summary of their proceeds on the last screen: which question was chosen to be executed, and what the outcome was.

IV.A.1   Payment

In order to calibrate payment properly, all questions should pay with equal probability. Each person should be paid based on the answer to a single question.

At the very end of the survey, respondents should be shown two screens regarding payment.

First, the respondent should be shown a summary of their proceeds: which question was chosen to be executed, and what the outcome was.

Then, on the final screen, the participants will see the following information:

> Thank you for participating in this study! Because of your answers and luck, you have earned [$reward_now_actual] points, which will be delivered to you by a Visa e-card that will be delivered to your email address ($email). Please be sure to check your email account for an email from Prepaid Digital Solutions, which will contain information on how to collect your incentive.

in which there is some pseudo-code in the text for various variables to fill in. [$reward_now_actual] should include the total of the amount earned for the choices made, and the payment for completing the survey. This amount should be displayed in dollars.

IV.B   CHANGED: Question Ordering and Randomization

The ordering has been changed slightly to reflect the removal of some modules.

There should be some randomization, but there are limits. In particular, we indicate by "random1" any (randomly selected, with equal probability, without replacement) member of {III.A, III.W}, by "random 2" any (randomly selected, with equal probability, without replacement) member of {III.D, III.E} and by "random3" any (randomly selected, with equal probability, without replacement) member of {III.Q, III.R, III.V}.

Then the ordering should be:

III.O.9, random2, random1, random3, random3, random3, III.O.10, random1, random2, III.O.11, III.M, and III.X.

Note that this leads to 24 different possible orderings.

IV.C   Moving through the Survey

Respondents must answer all questions before proceeding to the next page unless explicitly stated otherwise. Note that when an MPL is used, answering the question does not correspond to actually filling in a box in each row, see I.D. Respondents cannot move back once they have left a page.

IV.D   CHANGED: Progress

The only change here is that the number of modules, and hence the section numbering, has changed.

Progress will be noted by the Section, as in the construction of this document.

So, for example, when the subject enters the first section they will see at the top of the screen, "**Section 1 out of 10**". This will appear only on the first page of that section, centered at the top, in bold. The attention screeners do not count as sections, thus, this the first one of these screens will be displayed before III.D.

IV.E   Sample Size

We would like 1,000 unique links, although it is unlikely we will use more than 500 of them.

IV.F   Background Variables and Additional Data from YouGov

IV.G.1   Additional Data

In addition to the answers to all questions (it is preferable if MPLs are sent to us as columns indicating the right and left hand side answers, as currently done), we would like the following information:

- The number of errors a respondent makes in Section II.D (The MPL Training)
- Actual Question Order for that respondent (see Section IV.B)

- The number of times a respondent triggers a warning on a particular question (currently we know if they made a dominated choice, but not if they did so, got an error message, did so again, got an error message, and then changed, or something like that).

- Time to answer and click through each question (response time)

The time should be given for each sub-question in Section III.A and III.W.