**Attention over Sequential Outcomes - Measure by Sensitivity, Sept 2023**

**1. Hypothesis** What's the main question being asked or hypothesis being tested in this study?

Q: When people choose between different sequences of monetary rewards, how would they react to the changes in amount of reward offered in one certain time within a sequence?

H1: Their choices are less sensitive to these changes as the length of sequence increases.

H2: Their choices are less sensitive to these changes as the amounts offered in other times increase.

**2. Dependent variable** Describe the key dependent variable(s) specifying how they will be measured.

In our survey, each question is a choice list. In each row of the list, participants are required to choose between an immediate reward and a two-reward sequence. The immediate reward is denoted by “receive M today”, and the two-reward sequence is “receive X today and Y in T” (consisting of a reward X delivered immediately and a reward Y delivered later in time T).

The key dependent variable will be the participants’ choice between the immediate reward and the two-reward sequence. For H1, we examine how participants will react to the changes in X in their choices, given T (the length of sequence) increases. For H2, we examine how participants will react to the changes in X (or Y) in their choices, given the other reward Y (or X) increases. If their choices are less sensitive to a certain variable, each unit change in that variable should have a smaller impact on participants' likelihood of choosing the sequence over the immediate reward.

**3. Conditions** How many and which conditions will participants be assigned to?

Every participant is presented with the same questions. There are two conditions in the survey: In the first condition, in each question, the level of X increases by £10 with each row, starting from £10 and going up to £100, while the other variables (M, Y and T) keep constant. In the second condition, the same increasing pattern is followed by Y instead, keeping the others constant.

For each condition, M is selected from {£120, £100}, X or Y which is constant over rows is selected from {£90, £70, £50}, and each level of M is paired with each combination of the constant-over-rows X (or Y) and T.

Specifically, in the first condition, T is selected from {18 months, 9 months, 1 month}. The highest level of T is only combined with the highest level of Y (£90), the medium level of T is combined with the highest or medium level of Y (£90 or £70), the lowest level of T is combined with every level of Y (£90, £70 or £50). By this approach, we obtain 6 combinations of Y and T and thus 2\*6=12 questions (paired with M) for this condition. In the second condition, T equals 3 months. This T is combined with each level of X (£90, £70, £50). Pairing with M, we obtain 2\*3=6 questions for this condition.

**4.** **Analyses** Specify exactly which analyses you will conduct to examine the main question/hypothesis.

We will run logistic regressions for the observations collected under each condition respectively. Under the first condition, where X increases by rows, the main independent variables will be M, X, and the interaction term between Y and X as well as T and X. Under the second condition, where Y increases by rows, the main independent variables will be M, Y, and the interaction term between Y and X. We focus on fixed-effect coefficients. The sensitivity of participants’ choices to a certain variable under the change of another variable is measured by the coefficients for their interaction term. For H1, we examine whether under a higher Y (or X), a unit increase in X (or Y) will lead to a significantly smaller increase in participants’ likelihood of choosing the two-reward sequence. For H2, we examine whether under a higher T, a unit increase in X will lead to a significantly smaller increase in the likelihood of choosing the two-reward sequence.

**5. Outliers and Exclusions** Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Subjects will be excluded if they fail the attention check, or they spend less than 3 minutes in the entire survey. For attention check, we set two additional questions: (1) M=£10, X=£100, T=1 month, and Y increases by rows; (2) M=£300, X=£10, T=9 months, and Y increases by rows. For question (1), people should consistently choose the two-reward sequence in each row; for question (2), they should consistently choose the immediate reward.

**6. Sample Size** How many observations will be collected or what will determine sample size?

We will recruit 160 subjects. Prior to this study, we conducted a small pilot study (N=30). Using 6 questions in the pilot study, we calculate the estimate and standard error for each coefficient of interest in a mixed-effect regression. Based on these statistics, under significance level 0.05, we need around 160 participants to ensure a power of 0.7 in Wald test.

**7. Other** Anything else you would like to pre-register?

For an additional analysis, we will fit multiple models to data. These models include exponential, hyperbolic, and quasi-hyperbolic discounting, and a variant of attentional discounted utility. For calibrating the utility function in such models, we add three questions to the end of this survey. In each of these question, participants choose between a risky lottery “win W with probability 50%” and various sure rewards in a choice list. W is selected from {£50, £100, £180}, and we use this approach to elicit the certainty equivalent for each risky lottery.