An inconsistency between certain outcomes and uncertain incentives within behavioral methods

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In random–lottery incentive methods, the choices of certain (sure) outcomes are stimulated by uncertain lotteries. This inconsistency is evident, but only recently revealed. Certain and uncertain outcomes can differ from each other. The revealed inconsistency can hide this possible difference. The cause is: under the condition of the uncertain incentive, the questioned subjects can treat a certain outcome as an uncertain one. The considered critical empirical insight should be kept in mind by both theoreticians and practitioners. It leads also to more general questions of comparison of sure and probable (uncertain) outcomes those should be clarified to increase our understanding of behavior problems.

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1. Introduction

The present short article considers an inconsistency in the stimulation of certain (sure) outcomes by uncertain lotteries. Such stimulations are usual in behavioral incentive methods. This inconsistency leads to more general questions of comparison of sure and probable (uncertain) outcomes.

The article develops the report Harin (2014).

The article considers experimental results of well-known authors.

The need for this consideration is grounded on the prevalence and usefulness of the random–lottery incentive systems and their results both in behavioral researches and in practical applications.

2. Two features of the experiments

2.1. Uncertain incentives

Let us analyze one usual feature of behavioral experiments. Let us consider some typical descriptions of the experiments. One can see in the literature (the **boldface** is my own):

Loewenstein, & Thaler (1989), page 188: “The students … were told that the experimenter would select and implement one of their choices **at random**.”

Baltussen et al. (2012), page 424: “In the WRIS treatment, subjects play the game ten times, **one of which** for real payment. In the BRIS treatment, subjects play the game only once with a **one-in-ten** chance of real payment.” and page 425: “In both RIS treatments, a **ten-sided die** was thrown individually by each subject to determine her payment.”

Other sources such as Kahneman, Knetsch, & Thaler (1991), Choi et. al (2007), Larkin, & Leider (2012), Vossler, Doyon, & Rondeau (2012), Cox, Sadiraj, & Schmidt (2015), etc. give similar descriptions.

So, subjects are stimulated by random incentives. This is a well-known feature of the behavioral experiments.

Let us note that the stimulation (incentive) by a random payment selected from two or more alternatives may be called a random, uncertain stimulation. One may refer to it also as a stimulation by an uncertain incentive.

Such a random incentive procedure is usually referred to as the random–lottery incentive system (or the random lottery incentive system or random incentive system (RIS), or mechanisms "pay one randomly" (POR), etc.).

2.2. Certain outcomes

One can see another feature in the literature (the **boldface** and **underlining** are my own):

Starmer, & Sugden (1991), page 974: "subjects in groups B and C knew that they were taking part in a **random**–lottery experiment in which questions 21 and 22 had equal chances of being for real." and "One problem, which we shall call P', required a choice between two lotteries R' (for "riskier") and S' (for "**safer**"). R' gave a 0.2 chance of winning £10.00 and a 0.75 chance of winning £7.00 (with the residual 0.05 chance of winning nothing); S' gave £7.00 **for sure**."

Andreoni, & Sprenger (2012), page 3365: "One choice for each subject was selected for payment by drawing a numbered card **at random**. Subjects were told to treat each decision as if it were to determine their payments." and page 3366: "Section I provided a testable hypothesis for behavior across **certain** and uncertain intertemporal settings."

Other sources such as Holt, & Laury (2002), Harrison et al. (2005), Abdellaoui et al. (2011), Cox, Sadiraj, & Schmidt (2015), etc. give the same.

So, the random incentive procedures are used not only in the uncertain but in the certain situations too. Let us consider this more closely.

3. An inconsistency between the two features

3.1. An inconsistency between the certain outcomes and uncertain incentives

So, the well-known feature of the behavioral experiments is that subjects are stimulated by random incentives.

Let us consider stimulations with this uncertain incentive separately for uncertain and certain choices.

Suppose, that subjects choose an uncertain choice, that is, a choice whose probability is strictly less than *1* (and strictly more than *0*). In this case, the choice and the incentive are of the same type.

Suppose, that the subjects choose a certain choice that is, a choice whose probability is strictly equal to *1*. Here, the choice and the incentive are of the essentially different types. The choice is certain but the incentive is uncertain. In general, certain and uncertain outcomes can differ from each other.

Moreover, one should emphasize: this uncertain incentive can call into question the certain outcome. That is, under the condition of the uncertain

incentive, the subjects can treat a certain outcome as an uncertain one.

Therefore, there is an evident inconsistency between the above two features: the inconsistency between the certain type of the choice and the uncertain type of the incentive.

Therefore, the correctness of the use of uncertain incentives for certain outcomes cannot be unquestionable.

One may call this problem the "certain–uncertain" inconsistency.

This inconsistency is a fundamental and methodological one. Moreover, it raises a more general question of comparison of sure and probable outcomes. This question can embrace much more fields than its origin.

This inconsistency is evident but the author of this article has found no mention of it (or of similar questions) in the literature (except of author's works from 2014): see, e.g., Andreoni, & Sprenger (2012), Vossler, Doyon, & Rondeau (2012), Baltussen et al. (2012), Cox, Sadiraj, & Schmidt (2015), Vrijdags, & Marchant (2015).

The inconsistency was revealed in Harin (2014).

3.2. A role of the incentives

Incentives have been widely discussed in economics (see, e.g., Starmer, & Sugden, 1991; Fehr, & Falk, 2002; Holt, & Laury, 2002; Baltussen et al., 2012; Larkin, & Leider, 2012; Cox, Sadiraj, & Schmidt, 2015).

Do incentives influence the choices made by the subjects?

The correct answer needs a special investigation. However, one may be sure that if incentives did not have any influence on the choices made by the subjects, then there would be no reason to use such incentives.

Moreover, e.g., Table 4 in Cox, Sadiraj, & Schmidt (2015) manifests the essential differences in the same risk preferences revealed by subjects between various incentive mechanisms (in addition to other results of this article). This supports the positive answer to the question of the subsection.

Therefore, one may not exclude that incentives can influence the choices made by a subject.

Therefore, one may not exclude that an uncertain incentive can influence the choice of the certain outcome. Therefore, one may not exclude that an uncertain incentive can call into question the certain outcome, at least partially.

4. Experimental confirmations of the "certain–uncertain" inconsistency

4.1. The experiment of Starmer, & Sugden (1991)

Conditions. One can see the following in the description of the well-known experiment of Starmer & Sugden (1991):

Page 974: "For groups A and D, this page began with an underlined text stating that question 22 would be played for real. For groups B and C, the corresponding text stated that one of the two questions would be played for real and that which question was to played out would be decided at the end of the experiment in the following way. The subject would roll a six-sided die. If the

number on the die was 1, 2, or 3, then question 21 would be played; if the number was 4, 5, or 6, question 22 would be played. …

One problem, which we shall call P', required a choice between two lotteries R' (for "riskier") and S' (for "safer"). R' gave a 0.2 chance of winning £10.00 and a 0.75 chance of winning £7.00 (with the residual 0.05 chance of winning nothing); S' gave £7.00 for sure."

Results. So, in the R'-S' problem, R' gives *£10.00×0.2+£7.00×0.75 = £7.25*. S' gives *£7.00×1 = £7.00*. Here *R' = £7.25>S' = £7.00*.

Let us consider the results from table 2 on Page 976, those are of interest here (the **boldface** is my own):

- Group = B, Incentive = **Random lottery**, R':S' = **19:21**
- Group = C, Incentive = **Random lottery**, R':S' = **22:18**
- Group = D, Incentive = **P' real**, R':S' = **13:27**

One can evaluate the percentages of the subjects choosing the uncertain outcome. The total number of the subjects in each group is equal to *40 = 19+21 = 22+18 = 13+27*. So, for the **P' real** incentive, the percentage is equal to *13/40~33%*. It differs evidently and essentially from the percentages *19/40~48%* and *22/40=55%* for the **Random lottery** incentives.

Deduction. The percentages for random–lottery incentives (*48%* and *55%*) differ evidently from the percentage for real incentives (*33%*). So, one can easily deduce the random–lottery incentives can essentially modify and bias subjects' choices in comparison with the real incentives, when these choices include certain outcomes.

4.2. The experiments of Cox, Sadiraj, & Schmidt (2015)

Recent experiments of Cox, Sadiraj, & Schmidt (2015) also confirm the above deduction that the random lottery incentives can essentially modify subjects' choices in comparison with the real incentives, when these choices include certain outcomes. Note, some results of these experiments have the opposite directions of biases caused by the uncertain incentives.

5. Conclusions

The main results and conclusions of the present article are:

1) The random–lottery incentive systems have the inner inconsistency between the certain outcomes and uncertain incentives.

2) Under the condition of an uncertain incentive, the subjects can behave toward certain outcomes as toward uncertain ones. So, an uncertain incentive can call into question the certain outcome, at least partially.

3) The existing deductions from random–lottery incentive experiments, those include certain outcomes, cannot be unquestionably correct because of this "certain–uncertain" inconsistency. All these reasons should be taken into account by theoreticians and practitioners as a possible source of mistakes.

4) The random–lottery incentive systems need additional independent analyses and/or investigations in the context of this inconsistency.

5) The raised general question of comparison of sure and probable

outcomes needs further methodological development not only for theory. It can concern also practical situations of, e.g., stimulations of desirable behaviour of both employees in organizations and organizations themselves.

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