



Reports

Instructional manipulation checks: Detecting satisficing to increase statistical power

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ABSTRACT

Participants are not always as diligent in reading and following instructions as experimenters would like them to be. When participants fail to follow instructions, this increases noise and decreases the validity of their data. This paper presents and validates a new tool for detecting participants who are not following instructions – the Instructional manipulation check (IMC). We demonstrate how the inclusion of an IMC can increase statistical power and reliability of a dataset.

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Most experimenters have dealt with participants who are not as diligent as we would like them to be. Some participants, who give flippant answers or whose answers fall many standard deviations from the mean are discarded as outliers on the assumption that the data are purely noise and will merely serve to dilute the signal. However, not all participants advertise their negligence so blatantly. Some participants may skim instructions, missing key elements of the task or manipulation, or respond in a haphazard fashion that defies outlier analysis. These participants increase noise, reduce experimental power, and thus force experimenters to expend resources running more participants than would otherwise be necessary. Unfortunately, such participants have traditionally been challenging to detect and account for.

One theory that has addressed this problem is Krosnick's (1991) theory of satisficing in survey responses. Krosnick built on Herb Simon's (1957) idea that people have limited cognitive resources and attempt to minimize cognitive effort. To reduce demand, participants might satisfice: rather than attempting to find an optimal solution to a problem, people might go with the first minimally acceptable alternative that comes to mind.

Krosnick noted that responding to surveys often requires a great deal of cognitive effort (Krosnick, 1991; Krosnick, Narayan, & Smith, 1996). He hypothesized that participants might satisfice by choosing the first (as opposed to best) alternative that fits the question or, in extreme cases, by answering randomly.

By providing answers that do not accurately address the questions, satisficing participants decrease the signal-to-noise ratio of

a data set, and can substantially lower the power of an experiment. We propose that participants who are satisficing will often not bother to read the questions or instructions in a survey. Assuming that these questions and instructions are necessary to enable participants to complete the survey in a way that produces useful data, identifying these participants could substantially increase the power of the study.

Therefore, to detect satisficers we have developed a new methodological tool: the Instructional manipulation check (IMC). The IMC measures whether or not participants are reading the instructions, and thus provides an indirect measure of satisficing. It consists of a question embedded within the experimental materials that is similar to the other questions in length and response format (e.g. Likert scale, check boxes, etc.). However, unlike the other questions, the IMC asks participants to ignore the standard response format and instead provide a confirmation that they have read the instruction. For an example, see Fig. 1.

We gave a paper and pencil IMC in a packet of unrelated questionnaires to three different samples of participants. The text was identical to that in Fig. 1, with the exception that participants were told to "write 'I read the instructions' somewhere on the page" rather than clicking the title. To test an inherently motivated sample, we recruited 336 Stanford University undergraduates who were considering either a major or a minor in psychology and thus were expected to be motivated to take the survey seriously. To test a less motivated sample, we recruited 87 Stanford University undergraduates and visiting high school students who were not considering a major or minor in psychology. These participants were expected to be relatively unmotivated and more likely to engage in satisficing. Finally, to see if we could improve motivation, we recruited a third sample of 57 Stanford University

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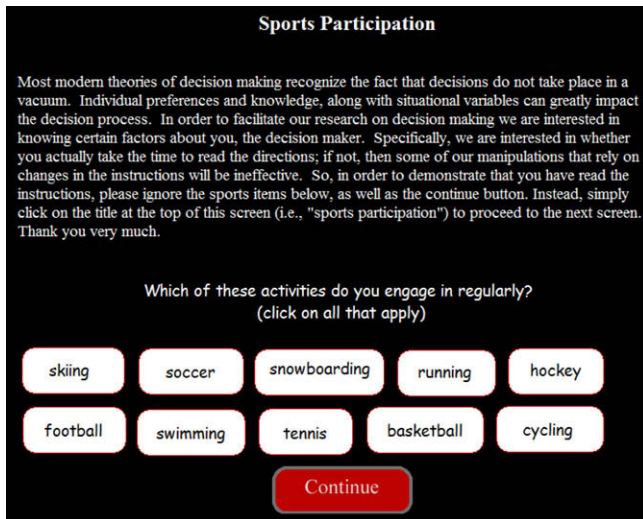


Fig. 1. Screen shot of IMC.

undergraduates who, like the second sample, were not considering a major or a minor in psychology and thus were expected to be relatively unmotivated. However, these surveys were proctored; supervision was expected to lead participants to take the surveys more seriously.

Participants who responded correctly by writing, "I read the instructions," or some variant thereof, were coded as having passed the IMC. Participants who failed to write anything about the instructions, or who filled out the activities preference form were coded as having failed the IMC.

As expected, the highest failure rate (28.7%) occurred in the non-motivated sample. This failure rate was a significantly higher than in both the motivated condition (17.5%; $\chi^2(1) = 5.42, p < .05$) and the supervised condition (14.0%; $\chi^2(1) = 4.21, p < .05$).

These preliminary findings demonstrate that a substantial number of people do not follow instructions when filling out questionnaires. Consistent with our interpretation of the IMC as a measure of satisficing, motivated or supervised participants were less likely to fail the IMC than participants who were neither motivated nor supervised.

Data from non-diligent participants adds noise and can substantially decrease statistical power. By including an IMC in a study, one can potentially identify this source of noise and eliminate it, thereby increasing power and allowing for reliable results with fewer resources and participants. Estimating the increase in power allowed through use of an IMC rests on the following assumptions: (1) participants who fail the IMC also fail to follow other instructions in the survey; and (2) failing to follow these other instructions will result in less reliable and valid data. Study 1 tests these assumptions.

Study 1

Study 1 investigated whether using an IMC to detect satisficing participants actually reduces noise and increases the power of an experiment. To this end, we replicated two well established and robust paradigms from the judgment and decision making literature, and examined whether participants who failed the IMC also failed to show the standard effects. We also examined whether there were systematic differences between participants who passed and failed the IMC, including demographics, self-reported motivation, or Need for Cognition (Cacioppo, Petty, & Kao, 1984).

Method

Participants

Two hundred and thirteen participants (156 women, 57 men) from New York University took part in the study in partial fulfillment of a course requirement or in exchange for \$10.

Stimuli, procedure and design

To determine whether removing participants who failed the IMC would increase the power of studies, two classic paradigms from the judgment and decision making literature were replicated. The first was Thaler's (1985) beer pricing task that demonstrates how different expectations can change people's willingness to pay for identical experiences. As many of the participants were under the legal drinking age, the scenario was changed to soda pricing. The exact wording was as follows:

You are on the beach on a hot day. For the last hour you have been thinking about how much you would enjoy an ice cold can of soda. Your companion needs to make a phone call and offers to bring back a soda from the only nearby place where drinks are sold, which happens to be a [run-down grocery store] [fancy resort]. Your companion asks how much you are willing to pay for the soda and will only buy it if it is below the price you state. How much are you willing to pay?

Participants randomly received one of the two versions of the scenario. Thaler (1985) found that participants were willing to pay substantially more for a beer from a fancy resort than from a run down grocery store, even though the experience of drinking the beer would be identical regardless of the source. However, the differences between the scenarios are quite subtle, consisting of changes to only two or three words. Therefore, a participant who was not paying close attention to the question may not be effectively exposed to the manipulation, and would thus serve as a source of noise.

The second paradigm was a sunk cost question, also adapted from Thaler (1985). The exact wording was as follows:

Imagine that your favorite football team is playing an important game. You have a ticket to the game that you [have paid handsomely for] [have received for free from a friend]. However, on the day of the game, it happens to be freezing cold. What do you do?

Participants randomly received one of the two versions of the scenario and indicated their intention to attend the game on a nine point scale (1 = *definitely stay at home*, 9 = *definitely go to the game*). Previous research has found that people are less likely to skip the game if they have paid for the tickets (Arkes & Blumer, 1985; Thaler, 1980). However, the effect relies on subtle differences in the wording that may be overlooked by participants who are not reading the questions carefully. Following the two judgment tasks, participants were provided with an IMC as described in the introduction (see Fig. 1 for a screen shot of the IMC).

We next examined how participants who failed the IMC differed from those who passed it. Participants provided demographic information and filled out an abbreviated 18 item Need for Cognition scale (Cacioppo et al., 1984). Furthermore, we recorded the amount of time that each participant took to complete the study, as participants who satisfice should take less time. Finally, participants indicated how motivated they were to complete the study (1 = *not motivated at all*, 9 = *very motivated*).

Results

Participants who clicked on the sports categories or the continue button rather than the title (as they were instructed to do),

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