

Nudge or Sludge? An In-Class Experimental Auction Illustrating How Misunderstood Scientific Information Can Change Consumer Behavior

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Appendix 2 Classroom Instructions

These instructions will describe several tasks (e.g., drink two ounces of water), and you will be asked to make an offer, or your willingness to accept, to do the task. Please note:

1. Your decisions may affect the amount of money they will earn.
2. No deception is permitted in experimental economics. The information in this experiment is true and not meant to deceive.

In these activities, you will write down (or submit electronically) your offer, being sure to keep it private from their classmates.

- The participant with the lowest offer wins the auction
 - The winner's payment is the amount in the second-lowest offer. It is important to bid your true value. Consider this example:
 - Suppose the task is to eat a piece of chocolate. Offers must be \$0.00 – \$9.99. Student A would be willing to eat the chocolate for \$0.00 but wants to try to game the system to earn money *and* eat the chocolate, so they offer \$1.00. Student B offers their true value of \$0.10. The sealed envelope (if included) is revealed to be \$7.50. Student B wins the auction, eats the chocolate, and earns \$1.00 (the second-price, and lower than the sealed envelope). Student A lost utility because they did not get to eat the chocolate, even though the price was more than their WTA. Student A therefore has the incentive to submit their true value of \$0.00. The incentive compatibility feature of a second-price auction is in contrast with a first-price auction, in which the winner receives the winner's offer. So, in the example above, there is no dominant strategy to offer truthfully because both Student A and Student B may receive some positive gain if they offer a slightly higher amount than their true value.
 - Offers must be between \$0.00 and \$9.99.
 - However, there is a limit on the maximum compensation to be paid. This value is determined by the instructor before the start of the session. This limit may be as high as \$9.99 and is chosen randomly for each part of the experiment. The maximum possible compensation is written on a piece of paper in the sealed envelope labeled with today's date at the front of the room. We will ask one of you to draw an envelope and show the limit to everyone at the end of this part of the experiment.
 - If you are unwilling to perform a specified task for any amount less than or equal to \$9.99, you may offer \$10.00 and you will not need to perform the task, no matter what.
 - In the case of a tie for the lowest offer, the winner will be chosen randomly among the lowest offers, and that winner will be paid the lowest offer.

Textbox 1. Second-Price Auction for Training Activity

What is smallest amount of money you are willing to accept to perform the tasks below?

- Offers must be \$0.00 – \$9.99.
- Person with the lowest offer is the winner and will receive second lowest offer*.
- If you are absolutely not willing to perform the task for less than \$10, you may offer \$10 and you will not have to perform the task.

Draw a Picture
Offer: \$

*or the predetermined maximum amount, to be revealed at the end of the experiment.

Textbox 2. Second-Price Auction for Drinking Water

What is smallest amount of money you are willing to accept to drink 2 ounces of the following water sources?

- Offers must be \$0.00 – \$9.99.
- Lowest offer is winner, will receive second lowest offer*.
- If you are absolutely not willing to perform the task for less than \$10, you may offer \$10 and you will not have to perform the task.

Bottled Water	Tap Water
Offer: \$	Offer: \$

*or the predetermined maximum amount, to be revealed at the end of the experiment.

Instructions for a Small Class Size (<24)

If conducting this experiment with fewer than 24 students, one option is to use a within-subject design. This avoids the issue of splitting the class into small treatment groups by conducting the second-price auction twice: first before the TDS information treatment is received and then again after the treatment.

1. Introduce students to the experiment
2. Conduct a practice second-price auction using training activity, discuss incentive-compatibility
3. Conduct a second-price auction with two types of drinking water
4. Test two types of water for TDS using a TDS meter.
5. Repeat second-price auction with two types of drinking water.
6. Review results of auctions and discuss implications and discussion topics listed below.

Total Dissolved Solids: FACT SHEET

Adapted from “Total Dissolved Solids in Drinking Water,”
https://www.who.int/water_sanitation_health/dwq/chemicals/tds.pdf

Total dissolved solids (TDS) is the term used to describe the inorganic salts and small amounts of organic matter present in solution in water. The principal constituents are usually calcium, magnesium, sodium, and potassium cations and carbonate, hydrogencarbonate, chloride, sulfate, and nitrate anions.

HOW DO THESE SOLIDS END UP DISSOLVED IN WATER?

These minerals can originate from several sources, both natural and because of human activities. Mineral springs contain water with high levels of dissolved solids because the water has flowed through a region where the rocks have a high salt content. Agricultural and urban runoff can carry excess minerals into water sources, as can wastewater discharges, industrial wastewater and salt that is used to de-ice roads.

WHAT HAPPENS TO THE WATER WHEN THE TDS LEVEL IS HIGH?

Alone, a high concentration of dissolved solids is usually not a health hazard. In fact, many people buy mineral water, which has naturally elevated levels of dissolved solids. The United States Environmental Protection Agency (EPA), which is responsible for drinking water regulations in the United States, includes TDS as a secondary standard, meaning that it is a voluntary guideline in the United States. In a study by the World Health Organization, a panel of tasters came to the following conclusions about the preferable level of TDS in water:

Level of TDS (milligrams per litre)	Rating
Less than 300	Excellent
300 - 600	Good
600 - 900	Fair
900 - 1,200	Poor
Above 1,200	Unacceptable

Taste of Water with Different TDS Concentrations

However, a very low concentration of TDS has been found to give water a flat taste, which is undesirable to many people.