RANDOMIZED RESPONSE

Introduction to Statistics - Lecture 2

Watch the video [An Embarrassing Survey - Randomized Response](https://youtu.be/nwJ0qY_rP0A) and answer the questions below.

You should discuss the answers with your group.

**1. Why sometimes you can’t simply ask the participants the question you’re interested in?**

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**2. Briefly summarize the idea behind the randomized response strategy presented in the video.**

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**3. What were the two questions that were asked in the survey described in the video?**

| *Q1*  *(the one you’re interested in):* |  |
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| *Q2*  *(the other one):* |  |

**4. How does a participant determine which question to answer?**

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**5. What is the probability that a participant of the study answers a particular question?**

| P(Q1) = |
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| P(Q2) = |
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In the survey described in the video, there were 100 participants.

Let’s denote their responses as X1, X2, …, X100.

Each person’s response Xi is a random variable that takes two values:   
1 (a YES-answer) or   
0 (a NO-answer).

In other words, Xi follows Bernoulli distribution with parameter   
q = P(Xi = 1)

**6. What is the probability of a YES-answer, i.e., P(Xi = 1) = q?**

| q = P(YES) = P(YES|Q1)\*P(Q1) + P(YES|Q2)\*P(Q2) = p\*0.5 + 1\*0.5 |
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**7. What is the probability of a NO-answer, i.e., P(Xi = 0) = 1 - q?**

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There were 60 YES-answers and 40 NO-answers.

**8. The presenter claims that from the 60 YES-answers, 10 must be for the question of interest, and 50 - to the other one. How did he come to this conclusion?**

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**9. What is the Maximum Likelihood Estimate (MLE) of the parameter q?**

| q\* = 0.6 |
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**10. What is the estimate of the true proportion of people answering YES to Q1? Derive from the MLE of q.**

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Imagine now that there were 80 YES-answers and 20 NO-answers.

**11. How would you estimate the number of people who answered YES to Q1?**

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**12. What would be the MLE of the q parameter in that case?**

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**13. What would be the estimate of the true proportion of people answering YES to Q1?**

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