

# Randomised Response Survey Activity

Sometimes you might want to ask sensitive questions, such as:

- Have you ever shoplifted?
- Have you done illicit drugs in the last 4 weeks?
- Are you satisfied with your job?
- Are you happy with the quality of this course?

This can come up in a variety of contexts such as surveys, collecting feedback, etc.

Questions like these can be problematic because embarrassment can lead people to lie.

Often this is attempted to be addressed by anonymising responses, but often even so people will lie because they are still concerned about their anonymity. One solution to this is to randomise the responses to the question. What follows are instructions that could be given to the person being asked such a question which illustrate how this could be done.

## Instructions:

- Read the question.
- Roll a six sided dice and mentally note the result (**do not show it to anybody!**).
- If you rolled a 1, answer "Yes".
- If you rolled a 2, answer "No".
- If you rolled a 3 or higher, answer truthfully.

The fact that the questioner does not know if the answer is truthful or the result of rolling a 1 or 2 empowers the person answering the question with the confidence of anonymity.

## Activity:

Pair up, and ask each other some questions, and randomise your responses. Notice how the added uncertainty allows you to answer truthfully without embarrassment?

Then, once you are comfortable with the process, take turns asking each other the following question:

- "Have you learnt something valuable from this session?"

Now all that remains is to do the calculations to reverse engineer how many people in the room are likely to have answered the above question with a "Yes" truthfully. To illustrate how to do this, see the worked example below.

## Calculations:

Say we surveyed 30 students in our class using this method. 12 of them responded with "Yes" (and so 18 responded "No") after randomising their responses.

- We expect that  $\frac{1}{6}$  (so, 5) of these students would have rolled a 1 and answered "Yes", and  $\frac{1}{6}$  (so, 5) would have rolled a 2 and answered "No".
- If we remove these, the remaining responses should be truthful. So 7 (12 minus 5) students would have rolled a 3 or higher and truthfully answered "Yes", and 13 would have answered "No" (18 minus 5). So our estimated proportion is  $\frac{7}{20}$  or 35%.

Notice how even though we estimate the number of students who truthfully answered "Yes" and such, we do not at any point know which students these would have been, and so the truthful answers remain anonymous throughout.