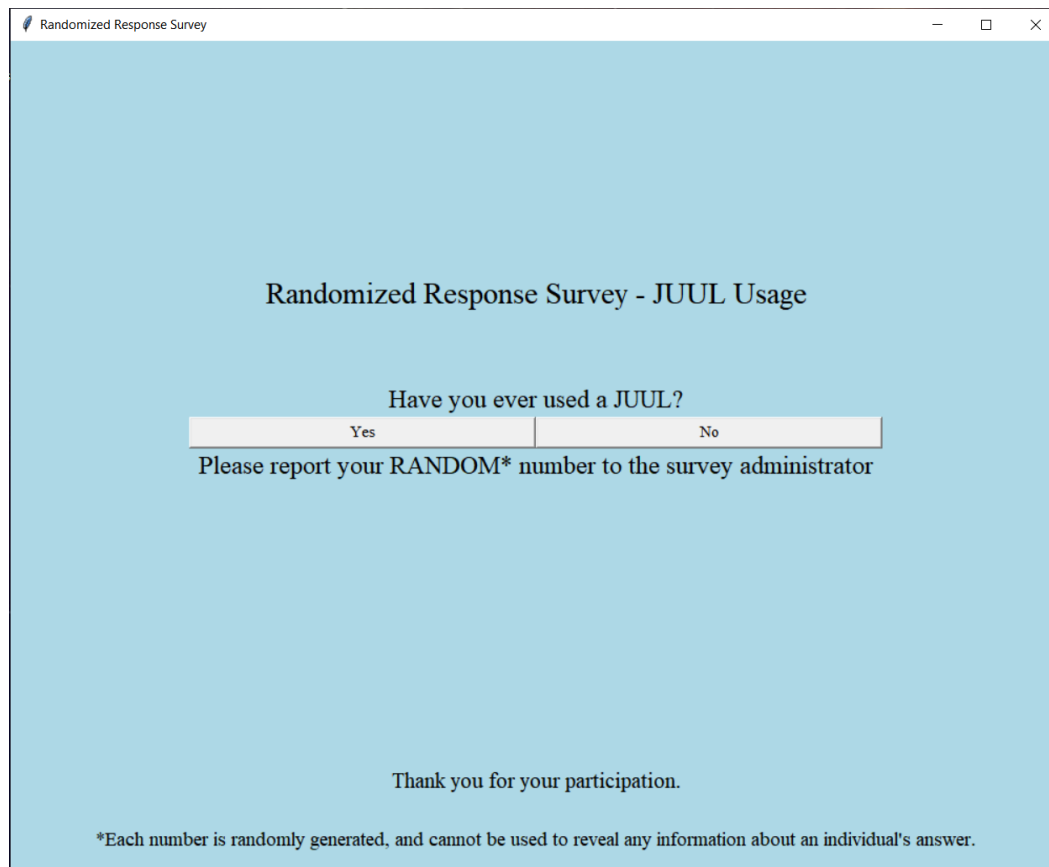


Randomized Response Survey with Python and Tkinter

A person participating in the survey will be presented with the following question:



The screenshot shows a Tkinter window titled "Randomized Response Survey" with a light blue background. The window contains the following text and elements:

- Window title: Randomized Response Survey
- Survey title: Randomized Response Survey - JUUL Usage
- Question: Have you ever used a JUUL?
- Response buttons: Yes and No (represented as a table with two columns)
- Instruction: Please report your RANDOM* number to the survey administrator
- Thank you message: Thank you for your participation.
- Footnote: *Each number is randomly generated, and cannot be used to reveal any information about an individual's answer.

Yes	No
-----	----

The surveyee will then click either “Yes” or “No”, depending on his status:

If “Yes”, a number will be randomly generated:

Randomized Response Survey

Randomized Response Survey - JUUL Usage

Have you ever used a JUUL?

Yes

No

Please report your RANDOM* number to the survey administrator

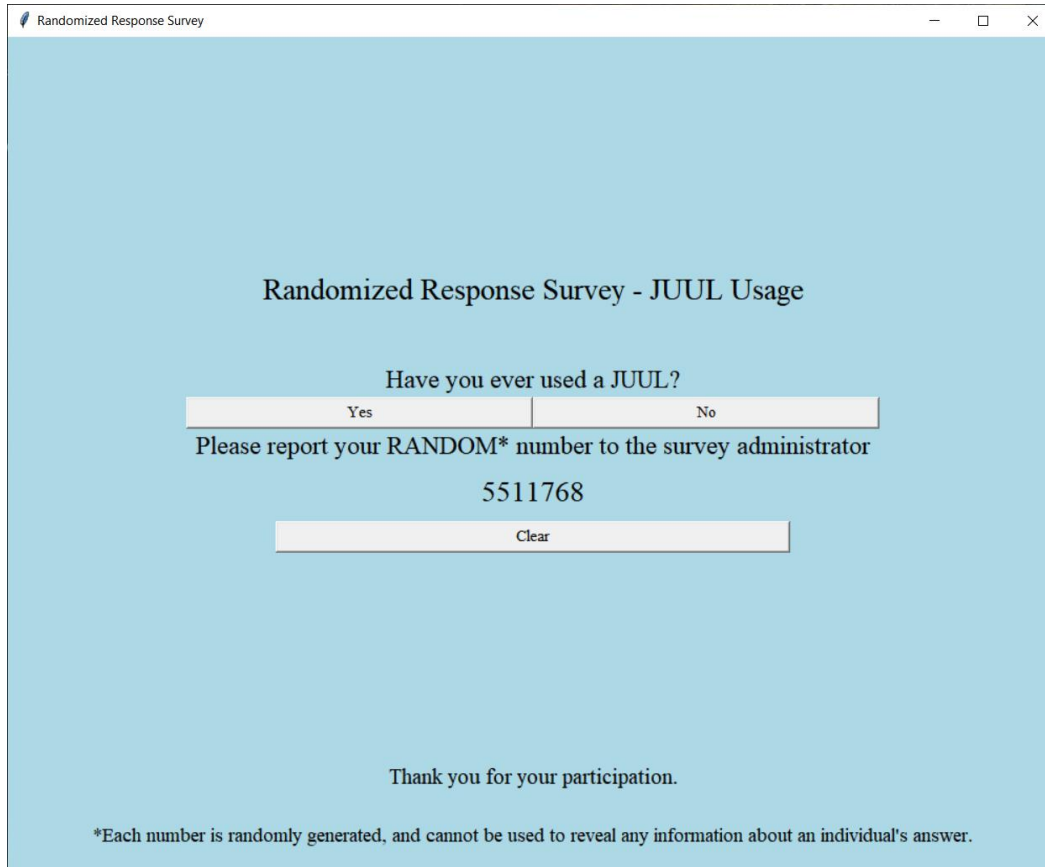
5306974

Clear

Thank you for your participation.

*Each number is randomly generated, and cannot be used to reveal any information about an individual's answer.

If No, a similarly valued number will be generated:



Randomized Response Survey - JUUL Usage

Have you ever used a JUUL?

Yes No

Please report your RANDOM* number to the survey administrator

5511768

Clear

Thank you for your participation.

*Each number is randomly generated, and cannot be used to reveal any information about an individual's answer.

These numbers are generated as the product of a negative binomial distribution and binomial distribution, with the probability of success itself being generated as a beta distribution. Knowing the associated parameters allows utilize the sum of the responses in order to estimate the population proportion which possess the sensitive characteristic. We do this using the following theorem (proven in my thesis to be unbiased).

Theorem 4.1. An unbiased estimator of the population proportion π is given by

$$\hat{\pi}_{zak} = \frac{\frac{1}{n} \sum_{i=1}^n Z_i - k_2 t_2}{(k_1 t_1 - k_2 t_2)}, \quad k_1 t_1 \neq k_2 t_2 \quad (4.2.16)$$

Since the responses are completely randomized, there is no way that an interviewer can guess what an individual's given response was, ensuring their privacy.