1. What question about a programming language do you want to answer?

   I want to answer how explicit memory management in C versus automatic memory management in Python affects beginner programmers' ability to understand program resource usage. This question interests me because I've experienced the shift from Python's simplicity to C's manual control and wonder how it shapes learning. My study will test whether beginners predict memory usage more accurately in C due to its explicitness.

2. Which of the following methods do you want to use to answer the question, either because it's the best method for the job or because you want to practice the method? Due to time constraints that you will have during the in-class experiment, we recommend only using one of the following methods in your study, not mixing them:

   a. Survey

   b. Semi-Structured Interview

   c. Think-Aloud Activity

I will use a Survey to answer my question about how explicit memory management in C v/s automatic memory management in Python affects beginner's understanding of resource usage. A survey will allow me to efficiently collect both qualitative and quantitative insights from classmates within the 10 minute time limit.

3. Survey: List of Questions

1. How much programming experience do you have?

   Type: Multiple choice

   Options:

   Less than 6 months

   6 months to 1 year

   1-2 years

   More than 2 years

2. Which of these languages have you used before? (Select all that apply)

   Type: Checkboxes

   Options:

   C

   Python

   Neither

   Both

3.

C Snippet:

How much memory does this program allocate for arr?

Type: Multiple choice

Options:

5 bytes

20 bytes

40 bytes

I’m not sure

4.

C Snippet: When is the memory for arr released?

Type: Multiple choice

Options:

Automatically when the program ends

Explicitly before the program ends (Correct: free(arr))

It’s never released

I’m not sure

5.

Python Snippet: How much memory does this program allocate for arr?

Type: Multiple choice

Options:

20 bytes

40-50 bytes

80-100 bytes (Correct: ~80 bytes, approximate)

I’m not sure

6.

Python Snippet: When is the memory for arr released?

Type: Multiple choice

Options:

Explicitly before the function ends

Automatically after the function ends (Correct: garbage collection)

It’s never released

I’m not sure

7.

I found it easy to understand memory usage in the C snippet.

Type: Likert scale

Options:

1: Strongly Disagree

2: Disagree

3: Neutral

4: Agree

5: Strongly Agree

8. I found it easy to understand memory usage in the Python snippet.

Type: Likert scale

Options: Same as above

9. I felt confident answering the memory questions about the C snippet.

Type: Likert scale

Options: Same as above

10. I felt confident answering the memory questions about the Python snippet.

Type: Likert scale

Options: Same as above

11.

What about C or Python made understanding memory usage easier or harder for you?

Type: Paragraph text

12.

How long did it take you to complete this survey? (Estimate in minutes)

Type: Short answer text

Question 4.

Both the participants took a average of 3-4 minutes. One of the feedback was to add a relevant open ended question and another feedback I got was to elaborate on Snippet B in class. I have revised my questions accordingly and will present so in class.