



# The Four Question Research Strategy

From: Cothron, Giese, and Rezba, *Students and Research*, 2000.

Identify your area of research interest:

Popcorn

1. What materials and tools are readily available for conducting experiments

on

**POPCORN?**

*your area of research interest*

**Response:**

Popcorn  
Oil  
Popper

2. How do(es) **POPCORN** act? What do(es) it do? What can you observe about **popcorn**?  
*your area of research interest*

**Response:**

***It pops.***

3. How can you change the set of materials to affect the action of **POPCORN?**  
*your area of research interest*

<b>Materials:</b> <i>one per column</i>	<b>Popcorn</b>	<b>Oil</b>	<b>Popper</b>		
<b>What can vary the material/ tool to change the action of your research interest?</b>	<ul style="list-style-type: none"> <li>▪ <b>Brand</b></li> <li>▪ <b>Amount</b></li> <li>▪ <b>Age</b></li> <li>▪ <b>Storage method</b></li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Brand</b></li> <li>▪ <b>Amount</b></li> <li>▪ <b>Kind</b></li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Brand</b></li> <li>▪ <b>Heating time</b></li> <li>▪ <b>Cooking time</b></li> </ul>		

4. How can you measure or describe the response of **your research interest** to the change? *Keep in mind the materials and tools you have on hand to make measurements.*

**Response:**

- **Count the number of popped kernels**
- **Measure the mass of the popped and unpopped kernels**
- **Describe the appearance of the popcorn**

**\*\* Remember to define how you will define your qualitative variables.**

5. What tools do you have available to observe and measure **your research interest's** response?

**Response:**

## Experimental Design Diagram

From: Cothron, Giese, and Rezba, *Students and Research*, 2000.

The Experimental Design Diagram is a concise way to describe an entire experiment.

**Title:** The Effect of Various Amounts of Oil on the Number of Popped Corn Kernels

**Hypothesis:** If the amount of oil placed on the popcorn is increased, then the number of popped kernels will increase.

**Independent Variable:** Amount of oil (unit of measure: milliliters )

### Levels of Independent Variable, Including the Control

0 (control)	10 ml	20 ml	30 ml	40 ml
<b>Repeated trials for each of the IV levels</b>				
3 times	3 times	3 times	3 times	3 times

**Dependent Variable:** number of popped kernels (unit of measure: kernels )

### Constants:

<i>Potential Variable</i>	<i>Level held constant</i>	<i>Potential Variable</i>	<i>Level held constant</i>
Popcorn brand "Pop-Rite"	type of oil	corn	
# kernels	100 kernels	popper brand "Cor-Pop"	
age of popcorn	fresh	heating time	2 minutes
brand of oil "Pazol"		cooking time	4 minutes

### Safety Considerations:

Popcorn should be poured on a surface and allowed to cool before handling.