

Name \_\_\_\_\_

## Lab for Two-Factor Design and Analysis

For this exercise, you need to design an experiment involving two factors. Let's examine a controversial issue in education and design an experiment around that issue. In part, this exercise may convince you of the difficulties in designing a compelling experiment for such a complex problem.

As you may know, there is a spirited debate over how best to teach children to read. Some people favor a "whole language" approach, in which the focus is on learning words as a unit. Other people favor a "phonetic" approach, in which the focus is on learning the basic units of speech (phonemes) and how they are represented in the sub-units of words (which can then be re-combined to form new words). Let's presume that these two approaches are uniform (i.e., no variability in teaching with either approach), which is unlikely, but simplifies our task a bit. Thus, there are two levels to this factor.

Furthermore, let's assume that a particular technique may work better in some circumstances than others. Choose *one* of the following factors to examine in addition to the teaching factor:

Socio-economic status of child: low, medium, high

Grade: 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>

Age in grade: younger than average, average, older than average

Quality of school: below average, average, above average

Parents' education: high school or less, some education beyond high school, college degree

Or, if you can think of another factor that you want to investigate, do so, as long as you can identify at least 3 levels of the factor.

Thus, you are designing a 2x3 independent groups experiment. In your design, think carefully about issues such as:

1. How would you operationally define your variables?
2. What would be a reasonable duration of your study?
3. What dependent variable makes the most sense?
4. How would you disentangle teacher (teaching ability) from teaching technique?
5. How many participants would you use?
6. How would you obtain parental consent?
7. Would you be able to assign participants randomly to conditions?

## Individual Differences and the “Second Factor” Save

Imagine that you conducted a single factor study of language learning, comparing the Whole Language approach to the Phonetic approach. Your dependent variable is a reading proficiency score (higher indicates better language proficiency). Suppose your results are as seen below:

	Whole	Phonetic
	20	25
	21	28
	23	29
	25	23
	22	25
	10	12
	8	10
	7	13
	7	10
	5	12
Sum ( <i>T</i> )	148	187
Mean	14.8	18.7
Variance	63.95	62.68

Complete the source table below:

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>
Between (Method)				
Within				
Total				

What would you conclude?

Now, let's assume that you had included an equal number of males and females in your experiment (first 5 in each condition were male and second 5 were female). The AB matrix would look something like this:

	Whole Language	Phonetics	Marginal (Gender)
M	$AB = 111$ Mean = 22.2 $SS = 14.8$	$AB = 130$ Mean = 26.0 $SS = 24.0$	$T = 241$ Mean = 24.1
F	$AB = 37$ Mean = 7.4 $SS = 13.2$	$AB = 57$ Mean = 11.4 $SS = 7.2$	$T = 94$ Mean = 9.4
Marginal (Method)	$T = 148$ Mean = 14.8	$T = 187$ Mean = 18.7	

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>
Method				
Gender				
Method x Gender				
Error (Within)				
Total				

Complete your analysis of these data. What has happened to the effect of Method of Reading Instruction? Why?

### Analysis of False Memory Experiment

<b>Source</b>	<b><i>SS</i></b>	<b><i>df</i></b>	<b><i>MS</i></b>	<b><i>F</i></b>
Type of Item				
Type of List				
Item x List				
Error (Within)				
Total				

Graph and interpret results: