

## Chapter 10: Common Experimental Research Designs

### Published Examples of Research Concepts

#### Contents

Factorial Designs

    Reading Comprehension

References

#### Factorial Designs

##### Reading Comprehension

The research reported by Seretny and Dean (1986) investigated the use of interspersed postpassage questions on the reading comprehension of second-grade children. It appears that the simple strategy of asking students questions about a passage after they read it and interspersing those questions throughout a story can significantly influence their comprehension. These researchers used an *experimental factorial design* in this study. In their own words, “Two factors, entering reading level . . . and use of interspersed postquestions . . . were combined factorially to form six experimental groups” (p. 228). Their design is therefore described as a 3 x 2 factorial: three categories of Reading Level (above average, average, below average) and two conditions of Questions (interspersed questions group and a no-questions control group). These factors combine to yield 6 different groups, as suggested by the 3 x 2.

One of their factors was a true independent (manipulated) variable (use of interspersed postpassage questions), and as such, enables the random assignment of subjects to the two groups. The other variable (reading level) is an attribute variable, since its groups are formed on the basis of an preexisting attribute. Because of this manipulated independent variable coupled with random assignment, this is considered a

true experimental design. And, as we have seen, because two factors have been combined, this design is also considered a *two-way factorial* experiment. Furthermore, because of the use of a control group and posttest (coupled with random assignment to control and questions groups), this design is more completely labeled a *randomized posttest, control group, true experimental, two-way factorial design*.

The dependent variable was the total number of correct responses on a reading comprehension test linked to the passages read by the students. Their findings are shown below.

**Means of SRA Dependent Variable,  
Broken Down by Questions Group and Reading Level**

<b>Questions Group</b>	<b>Reading Level</b>		
	<i>Above Average</i>	<i>Average</i>	<i>Below Average</i>
Interspersed	23.22	21.78	17.89
No Questions	22.78	19.44	13.44

Given the data in this table, we see how factorial designs are “partitioned” into their separate sources. The main effect for the Questions Group (independent variable) suggests that the interspersed (treatment) group overall outperformed the no question (control) group overall. It is important to recognize which means are being compared in this analysis. The *overall* interspersed mean is 20.96  $[(23.22 + 21.78 + 17.89)/3]$ . And the *overall* no questions mean is 18.55  $[(22.78 + 19.44 + 13.44)/3]$ . *Overall* here means over all levels of the other factor, Reading Level.

The main effect for Reading Level also suggests there are overall differences across the three reading groups. The means being compared here are as follows: 23.00  $[(23.22 + 22.78)/2]$  versus 20.61  $[(21.78 + 19.44)/2]$  versus 15.67  $[(17.89 + 13.44)/2]$  for the above average, average, and below average reading levels, respectively. The “overall” concept here again refers to overall levels of the other factor, the Questions Group as shown in the table (Interspersed and No Questions).

Finally, these researchers reported that the two factors of Reading Level and Questions Group interacted in their influence on reading comprehension. The presence of an interaction in this case tells us that the influence of the interspersed questions depends on the specific level of the reading group. Evidently, the treatment has a greater effect (compared to the control) for one level of reader than it does for another. Examine the table carefully and you can see that the influence of the treatment effect is very small (23.22 versus 22.78, or less than 1/2 point) for above average readers, but rather large (17.89 versus 13.44, or almost 4 1/2 points) for below average readers. The effect of the questions for the average readers falls in between. Clearly, one level of reader is affected differently by the Questions Group than another level, or simply, the treatment effect depends on reading level. Recall that the essence of interactive influence is the concept of “It depends.”

## References

Seretny, M. L., & Dean, R. S. (1986). Interspersed postpassage questions and reading comprehension achievement. *Journal of Educational Psychology, 78*(3), 228–229.