Chapter 7: Research Bias and Control

Published Examples of Research Concepts

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Control in Research

Reciprocal Teaching

Miller, Miller, and Rosen (1988) investigated the use of a modified system of reciprocal teaching to increase reading comprehension among seventh graders. This strategy involved small groups of students working together and taking turns "teaching" others by assisting with summarizing, questioning, clarifying, and predicting (called "modified reciprocal teaching," or MRT). The study is interesting because its design called for two control groups and one experimental group (MRT). Miller and colleagues utilized a researcher's most powerful control procedure: random assignment of students to conditions. We know that researchers use random assignment whenever and wherever they have the opportunity, and for good reason. No other method arranges for comparable groups, hence control, so effectively. The control is achieved not by ridding extraneous influences related to the learners (attitudes, interests, abilities, prior knowledge, hearing, etc.), but by scattering their influence haphazardly over all conditions or groups. This assures that their influence overall will be the same across groups. The researchers also

used the power of random assignment a second and third time, in the assignment of students to learning groups within the MRT condition and in the assignment of leaders to groups. Again, researchers try to avoid arbitrariness via the random process, fearing that a subtle contaminating bias could distort the results.

Miller and colleagues reported that the three groups were supervised by the *same* teacher, covered the *same* material, and completed the *same* projects and tests, which were graded and recorded by the *same* person. This concept of "sameness" (or, more technically, "constancy") is another important technique for controlling extraneous influences. Holding the influence of extraneous variables constant across the three conditions neutralized the potential contamination due to academic materials, projects, and the grading of tests. Obviously, you would want to avoid a situation where the MRT group covered more interesting material (with better designed projects) while the two control groups attempted to learn harder, duller material. Any differences in the dependent measures could then be attributed to teaching differences (the independent variable, which is what the researchers wanted) or to other unwanted influences such as the type of academic materials. Exposing all learners to the same influences in this way successfully holds them in check.

Miller and colleagues recognized that several control groups (yes, more than one!) are often necessary to neutralize the contaminating influences stemming from the

Campbell and Stanley threats (in this case, instrumentation in the form of testing and extraneous events). Let's examine this a bit more closely. The researchers used three groups, which are summarized below:

Experimental Group: MRT + tests + pre/post measures

Control Group I: No MRT + tests + pre/post measures

Control Group II: No MRT + no tests + pre/post measures

Focus on the first two groups (Experimental versus Control Group I). This comparison assesses the MRT effect (if any) while controlling for tests (this is because both groups are exposed to the same influence—tests). This comparison is important because it provides information about an MRT effect without confounding influence. If Control Group I had no MRT and no tests (and performed lower than the Experimental Group), the difference could be attributed to the MRT effect, the testing effect, or both. The findings would be ambiguous. The researchers, of course, want to attribute the difference to MRT, not to the tests. Now focus on the two control groups only. This comparison assesses the pure testing effect. (Neither group had MRT, so the MRT effect was not relevant in this comparison). In this way, the three groups in concert provide good information about both the MRT effect and the testing effect, each uncontaminated by the other's influence.

Note that there is no good control for the Hawthorne effect (the guinea pig effect)

in this study. This would require a third control group, one receiving some type of "special" teaching, but one that is not expected to affect reading comprehension. This group's performance could then be used to tease apart the MRT effect from the "gee whiz" effect associated with being treated in a special way.

Miller and colleagues also reported that the teacher had no knowledge of the test content used to compare the three groups' reading comprehension. This a control for the potential biasing influence of the teacher. Had she known what the test items were, then she may have consciously or unconsciously tipped the scales in favor of the Experimental Group (since they were expected to do better in their reading comprehension). Quite possibly, the teacher may have emphasized test content more in the presence of the MRT students. In this sense, the teacher was blind to the content of the tests.

These researchers described other measures collected in their study, including grades and measures of conduct. The conduct measures were operationally defined in terms of absences, tardies, and suspensions. All were obtained directly from the attendance officer (not from the students themselves). Do you see any bias or contamination (distortion) associated with asking students themselves about the frequency of such undesirable behaviors as tardies and suspensions? Yes. They may have truly forgotten about tardies, or even exaggerated them for some reason. Or they may have denied the true frequency of suspensions, wanting to appear better behaved. Clearly,

a more objective method was decided upon, and for good reason.

Finally, it is interesting to note that the researchers also assessed writing skill to see whether there might be a *spillover effect* in reading instruction to the area of writing. Writing skill is often difficult to operationally define in ways that are reliable and valid. The researchers solved this problem by scoring a 3-minute writing exercise very simply: They counted the number of words written (excluding numbers, dates, and addresses). Although Chapter 7 is not directly concerned with operational definitions, this outcome measure might cause a careful reader to wonder, "Is quantity the same as quality?" The researchers apparently assumed, at least for seventh graders, that those who write more also write better. More research will determine whether there is indeed a correlation between writing length and skill.

References

Miller, C. D., Miller, L. F., & Rosen, L. A. (1988). Modified reciprocal teaching in a regular classroom. *Journal of Experimental Education*, *56*(4), 183–186.