

## Motivation and Creativity—A Randomized Experiment

Creativity scores in two motivation groups, and their summary statistics

|                                   | <b>Intrinsic group</b> |      | <b>Extrinsic group</b> |      |
|-----------------------------------|------------------------|------|------------------------|------|
|                                   | 12.0                   | 20.5 | 5.0                    | 17.4 |
|                                   | 12.0                   | 20.6 | 5.4                    | 17.5 |
|                                   | 12.9                   | 21.3 | 6.1                    | 18.5 |
|                                   | 13.6                   | 21.6 | 10.9                   | 18.7 |
|                                   | 16.6                   | 22.1 | 11.8                   | 18.7 |
|                                   | 17.2                   | 22.2 | 12.0                   | 19.2 |
|                                   | 17.5                   | 22.6 | 12.3                   | 19.5 |
|                                   | 18.2                   | 23.1 | 14.8                   | 20.7 |
|                                   | 19.1                   | 24.0 | 15.0                   | 21.2 |
|                                   | 19.3                   | 24.3 | 16.8                   | 22.1 |
|                                   | 19.8                   | 26.7 | 17.2                   | 24.0 |
|                                   | 20.3                   | 29.7 | 17.2                   |      |
| <b>Sample Size:</b>               | 24                     |      | 23                     |      |
| <b>Average:</b>                   | 19.88                  |      | 15.74                  |      |
| <b>Sample Standard Deviation:</b> | 4.44                   |      | 5.25                   |      |

After completing the questionnaire, all subjects were asked to write a poem in the Haiku style about “laughter.” All poems were submitted to 12 poets, who evaluated them on a 40-point scale of creativity, based on their own subjective views. Judges were not told about the study’s purpose. The average ratings given by the 12 judges are shown for each of the study subjects in Display 1.1. (Data based

**DISPLAY 1.2**

Questionnaires given creative writers, to rank intrinsic and extrinsic reasons for writing

**INSTRUCTIONS:** Please rank the following list of reasons for writing, in order of personal importance to you (1 = highest, 7 = lowest).

- You get a lot of pleasure out of reading something good that you have written.
- You enjoy the opportunity for self-expression.
- You achieve new insights through your writing.
- You derive satisfaction from expressing yourself clearly and eloquently.
- You feel relaxed when writing.
- You like to play with words.
- You enjoy becoming involved with ideas, characters, events, and images in your writing.

*List of extrinsic  
reasons for writing.*

*List of intrinsic  
reasons for writing.*

**INSTRUCTIONS:** Please rank the following list of reasons for writing, in order of personal importance to you (1 = highest, 7 = lowest).

- You realize that, with the introduction of dozens of magazines every year, the market for free-lance writing is constantly expanding.
- You want your writing teachers to be favorably impressed with your writing talent.
- You have heard of cases where one best-selling novel or collection of poems has made the author financially secure.
- You enjoy public recognition of your work.
- You know that many of the best jobs available require good writing skills.
- You know that writing ability is one of the major criteria for acceptance into graduate school.
- Your teachers and parents have encouraged you to go into writing.

on the study in T. Amabile, "Motivation and Creativity: Effects of Motivational Orientation on Creative Writers," *Journal of Personality and Social Psychology* 48(2) (1985): 393–99.) Is there any evidence that creativity scores tend to be affected by the type of motivation (intrinsic or extrinsic) induced by the questionnaires?

**Statistical Conclusion**

This experiment provides strong evidence that receiving the "intrinsic" rather than the "extrinsic" questionnaire caused students in this study to score higher on poem creativity (two-sided  $p$ -value = 0.005 from a two-sample  $t$ -test as an approximation to a randomization test). The estimated treatment effect—the increase in score attributed to the "intrinsic" questionnaire—is 4.1 points (95% confidence interval: 1.3 to 7.0 points) on a 0–40-point scale.

**Note:** The statistical conclusions associated with the case studies in each chapter use tools and, in some cases, terms that are introduced later. You should read the conclusions initially to appreciate the scientific statements that can be

drawn from the chapter's tools, without worrying about the parts you don't understand, and then return to them again after reading the chapter for a more complete understanding.

### ***Scope of Inference***

Since this was a randomized experiment, one may infer that the difference in creativity scores was *caused* by the difference in motivational questionnaires. Because the subjects were not selected randomly from any population, extending this inference to any other group is speculative. This deficiency, however, is minor; the causal conclusion is strong even if it applies only to the recruited subjects.