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Using the Three Stooges to Illustrate the Scientific Method

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An exercise using a comedy film is proposed for illustrating social science experimentation and the scientific method. Not every consumer of research or data reports may have had training in research methodology. This article offers a way of introducing research methods and the critical examination of such reports to these consumers, who are often the ones most needful of rigor in assessing data, rather than taking things at face value. Whether one is evaluating information from business, government, or media sources, the lessons learned from Moe, Larry, and Curly in *Hoi Polloi* are quite valuable. *Organization Management Journal*, 9: 249–254, 2012. doi: 10.1080/15416518.2012.738531

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In his classic spoof on the scientific method and social science research in general, the pseudonym “Murdock Pencil” questions, “Why does salt move from one end of a table to another when someone says, ‘Please pass the salt?’” (Pencil, 1976). In summarizing the research findings, Pencil notes that it seems to make a difference in favor of the positive versus negative salt passage condition if other people are present in the “salt passage condition.” Gourmands the world over were indubitably comforted by these important findings.

Like the readers of Professor Pencil’s article, those assessing the importance of various studies in the social sciences are often left to discern for themselves if their faith in the rigor of the method boosts their willingness to accept the relevance of the findings. Hubbard and Armstrong (2006) claim, “We don’t really know what statistical significance means,” and Lin, Lucas, and Shmueli (2009) argue that “studies based on large samples that rely on low p values may result in misleading conclusions about the research.”

In the case of the “Please pass the salt” article, the reader is seduced into admiring Dr. Pencil’s method but cannot help but laugh at the madness of the results. Perhaps additional, humorous ways for illustrating the scientific method would also be

welcome to help business people, practitioners, and learners of all kinds understand and appreciate statistical hypothesis testing and the interpretation of its results. Hoerl and Snee (2010) call for “moving the statistics profession forward to the next level” by improving, among other things, the interpretation of the results. Ben Goldacre’s *Bad Science* newspaper column, blog, and books also attempt to enlighten people with humor and rigor. However, his 300-page book *Bad Science: Quacks, Hacks, and Big Pharma Flacks*, for one example, might be an ambitious ride for most consumers. The authors of this article have found success in this area through the work of a trio of comedians from yesteryear: Moe, Larry, and Curly.

Why a Three Stooges film? First, there is a strong advantage to the medium of video. We can *show* behaviors or principles in *action*. If one picture is worth a thousand words, a video vignette is much richer than a descriptive paragraph. Second, consider this event, which happened to one of the authors. He once ran into a student in downtown Chicago who had graduated two years previous to their meeting. In the conversation, she recalled in detail a video segment that had been used in class. When asked about the underlying point of the video, she was able to accurately state the lesson. While it was tempting to attribute this phenomenon to superior teaching ability, the more likely reason is that she was recalling a relatively unique portion of her coursework; it stood out. The novelty of the use of such a clip in class, and the humor in that clip, made it memorable. The important point is not that she remembered the video, however. The important point is she remembered the lesson. The lesson was on the scientific method. The clip was from the Three Stooges film *Hoi Polloi* (Lord, 1935).¹

Using humor as a memory anchor has been an effective aid in teaching, in our experience. Of course, there has to be substance underlying the humor. This article describes how one specific application of humor (*Hoi Polloi*) coupled with substance (social science experimentation) is used to lay the groundwork for understanding and having confidence in social science research. For persons not deeply engaged in research methodologies—which include numerous corporate trainers, practitioners, and information technologists—the social sciences might appear “iffy” compared to hard sciences such as chemistry or physics. Those who must assess material that is

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based on the scientific method will benefit from an understanding of proper methodology in their reviewing results of research, and in interpreting those results for applied use.

HOI POLLOI

The Three Stooges film *Hoi Polloi* (1935) opens with two professors debating the general possibility that the effect of environmental intervention is transformative. This general debate soon becomes a specific proposition that men from the “lowest strata of life” can be transformed into gentlemen with proper training. Professor Richmond’s position is represented with his statement, “I reiterate that environment is the keynote to social distinction.” Professor Nichols adamantly disagrees, noting that heredity is the chief influence on a person’s behavior:

Nichols: “Nonsense. Heredity is the backbone of social life.”

Richmond: “I say environment.”

Nichols: “Bah. Heredity.”

Richmond: “I’ll wager you ten thousand dollars that I can take a man from the lowest strata of life, and with three months time, with environment, make him a gentleman.”

Nichols: “Well, of course there are exceptions.”

Richmond: “Uh! I’ll make it two men.”

Nichols: “Make it three and I’ll accept your wager.”

Richmond: “Three it is! And in three months from today, I’ll collect from you.”

So which is it: Environment or heredity? Nature or nurture? The stage is set for an experiment to see whether three garbage men—Larry, Moe, and Curly—can be transformed into gentlemen, so that Professor Richmond can prove his hypothesis and win the \$10,000 wager.

THE WAGER

The wager between the two professors contains a number of elements that concisely illustrate the scientific method. These elements can be described to demonstrate how the scientific method is essential to proper social science experimentation.

The four components of the professors’ wager constitute the essence of the scientific method (Figure 1):

1. Sample size. The professors acknowledge that experimenting on one man will not be adequate (“Well, there *are* exceptions.”) While two might be sufficient, the professors decide that three men would be a sufficient sample size.
2. Timeline. The professors specify an ending date upon which to make their judgment as to whether the experiment was a success. A definite endpoint prevents Professor Richmond from pleading his treatment may work “eventually.”
3. Population from which the sample is to be drawn. To illustrate the efficiency of his treatment, Professor Richmond must show sufficient strength of the treatment’s effect. If the subjects were men who were almost gentlemen, it is possible they might improve to the level of gentlemen either on their own, or due to circumstances unrelated to

Richmond’s treatment. In having the subjects drawn from the lowest strata of society, a successful result would indicate Richmond’s treatment was not only effective, but strong.

4. Operational definition of “gentlemen.” Both professors seem to agree what is meant by the term “gentlemen.” Unfortunately, the viewer is not privy to how they arrived at a mutually agreeable definition. But it is understood that they have the same operational definition of “gentlemen.” Thus at the subsequent reception, the professors will judge the Stooges’ behavior against the benchmark inherent in the operational definition.

THE EXPERIMENTAL TREATMENT

The experimental treatment is administered to the Three Stooges in the form of etiquette training by Professor Richmond and his assistant. The treatment in this case is training the Stooges in the art of being gentlemen. Richmond’s assistant is charged with trying to teach the Stooges how to dance gracefully. The professor attempts to teach them proper grammar and elocution. The training for proper dining etiquette takes the form of a role play, in which a pretend dinner party is enacted.

The viewer is treated to a series of vignettes depicting the ill-attempts of this training. First, table etiquette, in the form of eating an imaginary meal, allows the Stooges to demonstrate some rather inappropriate table manners through pantomime and self-provided sound effects. Then the reading and grammar lesson indicates an inability to read or comprehend material from even the lowest school grade. Finally, an attempt at graceful dancing reveals a lack not only of coordination skills, but of counting ability as well. In all these scenarios, slapstick reigns!

Viewers also witness a harbinger of the inevitable disaster. While each Stooge is provided a separate bed, they all sleep in one bed, performing their trademark snoring routine. Even modest trappings of affluence are beyond their grasp.

RESULTS

To determine the outcome of their experiment, Professors Richmond and Nichols observe the Stooges’ behavior at a reception. The Stooges’ performance will decide the wager. The mayhem that results, including the obligatory pie fight that ends the film, points to the failure of this particular experiment, at least from Professor Richmond’s perspective. All his training failed to turn Moe, Larry, and Curly into Moses, Lawrence, and Jerome.

What does this prove? That the Stooges are not gentlemen? Well, to the casual observer, the answer is clearly, “No, they are not. Anyone can tell that just by looking at them.” (In fact, a staple gag throughout the Stooges film career is them reflexively looking behind them when someone calls them “gentlemen,” because they *know* it can’t be them.) Yet as researchers, we know the dangers of making inferences that are not based on

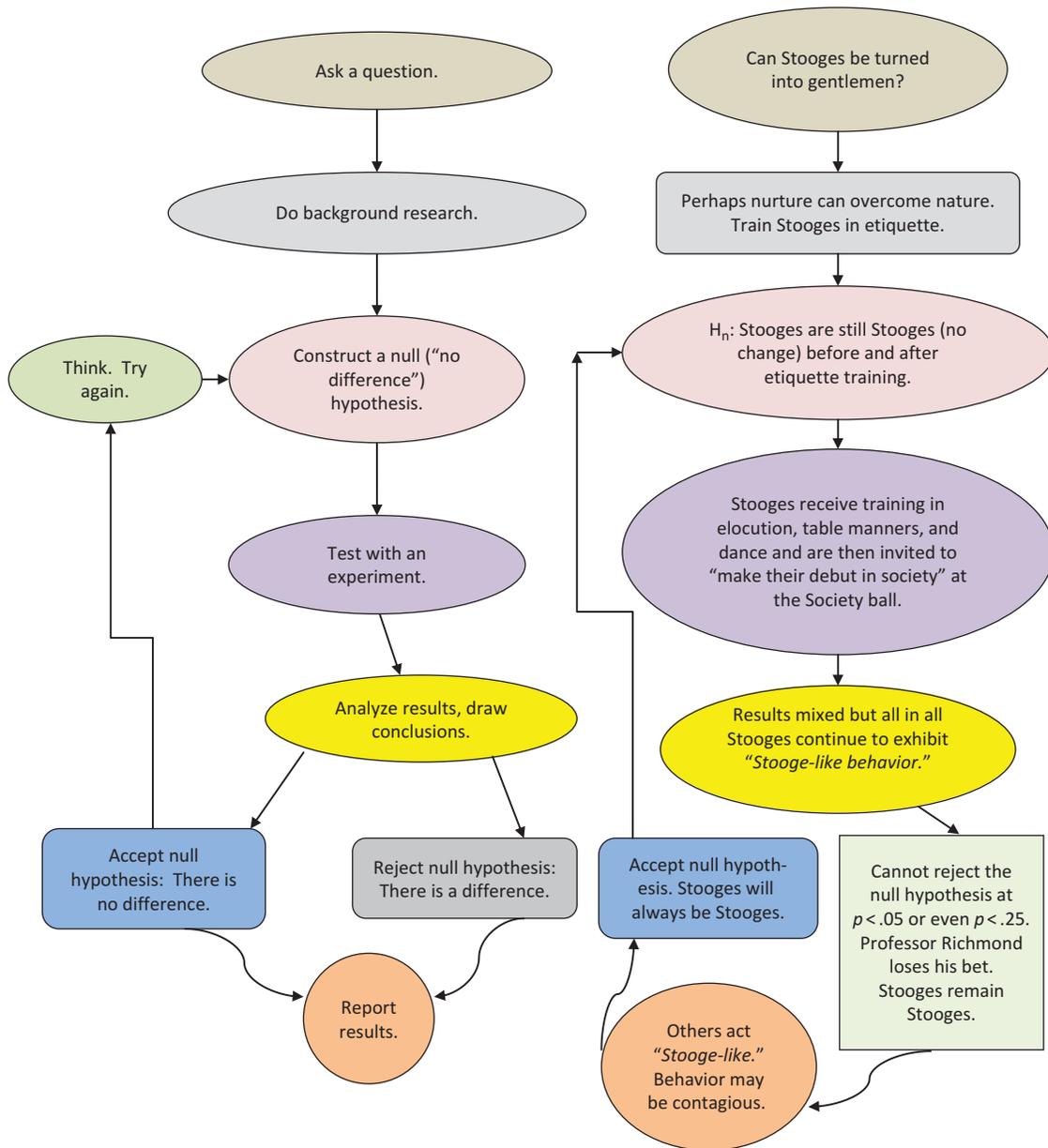


FIG. 1. The scientific method illustrated by the Three Stooges short, *Hoi Polloi* (color figure available online).

empirical tests. In simpler terms, we would be remiss to judge books by their covers.

In this particular case, however, the content does reflect the cover. But we only have confidence in formally making that conclusion because we have been privy to the process by which Professor Richman attempted to transform the Stooges into gentlemen. We are witness to the conditions and the design of the experiment—the more or less scientific methodology employed. This is a major point Goldacre (2010) makes. If we are to be adept consumers of research, we need to know the back story of a research study, not simply a statement of results.

Without such insights, we would be better off carrying a healthy skepticism for superficial assertions relating not only to our film example, but also for most propositions, suppositions, claims, and counterclaims made by industry, government, and the media. Examples include “Winston tastes good like a cigarette should” or “The United States is winning the war in Afghanistan” or “Red meat is good for you” because “Beef—it’s what’s for dinner” or that the latest information technology software upgrade is worth the additional cost or that volcanic ash clouds must ground the flights of the European continent for an entire week. Where’s the proof? What testing was done?

If nothing else, breaking down the trusting nature of the populace may be a first step in asking them to replace naïve beliefs based on Madison Avenue or Fleet Street's fluff with grounded findings based on the scientific method and its generation of empirical and verifiable results. In light of various food scandals, business scandals, war scandals, and more and more sex scandals, even Stooges can probably agree that such a replacement coupled with a healthy dose of skepticism is sorely needed.

HANDOUT

To introduce this topic in training sessions or the classroom, a handout guiding learners through the scientific method is provided (see the Appendix). The topic should probably begin with an examination of how the subject is broached in the textbook. For example, in the author's management text *Behavior in Organizations* (Greenberg, 2010), the topic of survey and experimental research is introduced in the appendix and the scientific method is discussed in some detail.

Students should be assigned to read the text's section on the scientific method. The class might begin with the instructor conducting an overview of the textual material and then handing out the attachment, "The Stooges and Science" (the Appendix). This attachment should also be accompanied by the illustration (Figure 1) of the scientific method, which has an accompanying, side-by-side application from the Stooges short. The session should then progress with a viewing of *Hoi Polloi*, followed by a period of time reserved for students to fill in the blanks contained in the attachment. A discussion should then be led by the instructor for the purpose of determining if the students mastered the concept.

REFLECTION

In running this session, the authors have found that students greatly enjoy the film and find most of the discussion useful. Most are able to master the salient points as outlined in Figure 1. The material on Type 1 and Type 2 errors discussed in the handout proves to be more problematical. Students typically master the concept associated with Type 1 errors but fail to understand the application of Type 2 errors. Those students who skipped a lab course or opted out of their required hard science elective can be especially difficult to reach. One way of explaining this further is to pose the scenario of the Stooges actually becoming gentlemen in the course of the experiment, but then pretending not to be in order to double cross Professor Richmond. By observing their now "pretend" behavior, we would conclude that the null hypothesis (no difference in Stooge behavior after experimental treatment) is upheld, when in reality we should have rejected it.

CONCLUSION

The need to pay special attention to the teaching of Type 2 errors aside, the authors believe the *Hoi Polloi* exercise

effectively presents most of the salient features associated with the scientific method in a thought-provoking and enjoyable manner. Using a comedic medium to illuminate the basics of scientific research not only makes this a painless topic for students, but also allows the instructor to revisit the film's plot and its analysis as a bridge to understanding other research discussed in a course. One of the authors has used this as an example for more than 20 years. It endures because of its success. The authors and the students agree that the lessons learned from Moe, Larry, and Curly in *Hoi Polloi* are timeless in terms of their applicability to today's uncertainties and invaluable as a lesson to master the scientific method.

NOTE

1. Available from Amazon at <http://www.amazon.ca/Three-Stooges-Polloi-Moe-Howard/dp/6304092083> or on YouTube at <http://www.youtube.com/watch?v=2it6acqnrq4>.

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APPENDIX

STUDENT HANDOUT: THE STOOGES AND SCIENCE

This handout's purpose and organization is detailed as follows. The purpose is to illustrate the scientific method. This will be done by having you complete a few "Fill ins" based on the handout's four sections. The sections are:

- I. The Scientific Method Begins With Questioning
- II. The Scientific Method Progresses to the Construction of a Hypothesis
- III. The Scientific Method Involves Experimental Testing
- IV. The Scientific Experiment Involves Drawing Conclusions

I. The Scientific Method Begins With Questioning

The scientific method (see Figure 1) begins with the scientist asking questions based on research which leads to the construction of a hypothesis. The Columbia Pictures short subject *Hoi Polloi* (1935) may be illustrative of the scientific method albeit in a lighthearted way. The short film opens with Professors Richmond and Nichols making declarative statements:

Professor Richmond: "I reiterate that environment is the keynote to social distinction."
 Professor Nichols: "Nonsense. Heredity is the backbone of social life."

In the space below, rephrase these statements in the form of preliminary questions:

1. Professor Richmond might ask (based on observable phenomenon): _____?
2. Professor Nichols might wonder (based on his interpretation of the same observable phenomenon): _____?

II. The Scientific Method Progresses to the Construction of a Hypothesis

A hypothesis is a suggested explanation of an observable phenomenon. In the social sciences, hypothesis testing is often set up by claiming there is no difference in the random samples. The null hypothesis is rejected and an alternative hypothesis is accepted if the test shows that there is a difference in the mean scores of the samples and that the difference is statistically significant. This process is notationally represented as:

$$H_0 : u_1 = u_2,$$

where H_0 = the null hypothesis, U_1 = the mean of population 1, and U_2 = the mean of population 2. (Note these are sample means. It is assumed that the sample means are an accurate reflection of the population mean. Is this assumption correct? Why or why not?)

Professors Richmond and Nichols make a wager. The wager contains:

1. A time element: three months.
2. A sample size: three men.
3. An agreement about the measurable outcome: "gentlemen."

An experiment follows.

Based on the statements of Professors Richmond and Nichols, a "null hypothesis" (no difference) and an alternative hypothesis are constructed below.

1. Null Hypothesis: After the experimental treatment, it will be found that there is no difference between the sample behaviors of the Three Stooges (who are drawn from the lowest strata of society to begin with) before treatment and the sample behaviors of the Stooges after the treatment (at which point they will be products of the environment). If "no difference" is found, who wins?

Circle one:

- a. Professor Richmond (who believes in nurture or training or environment) wins.
- b. Professor Nichols (who believes in nature or heredity) wins.

2. Alternative Hypothesis: After the experimental treatment, it will be found that there is a difference in the sample behaviors of the Three Stooges (who are drawn from the lowest strata of society to begin with) and the sample behavior of the Stooges who—after treatment—behave like perfect gentlemen as a result of the environmental intervention (training).

If the null hypothesis is rejected and the alternative hypothesis is accepted, who wins?

Circle one:

- a. Professor Richmond wins.
- b. Professor Nichols wins.

III. The Scientific Method Involves Experimental Testing

Describe some aspects of the experimental treatment. What is the nature of this treatment? Does the treatment seem to be having an effect?

Describe two incidents in the short film that make you think you will not reject the null hypothesis and accept the alternative hypothesis because the treatment did not work.

1. _____
2. _____

Describe two incidents in the short film that make you think you will reject the null hypothesis and accept the alternative hypothesis because the treatment worked.

1. _____
2. _____

In some ways a group of sophisticated aristocrats is used as a "control group" or "group of test subjects left untreated or unexposed to some procedure and then compared with treated subjects in order to validate the results of the test." If in fact the Stooges are being transformed into "gentlemen," then the control group serves as examples of that "genteel society" that the Stooges aspire to become. However, as the end of *Hoi Polloi* shows, if in fact this group of aristocrats were to be used as a "control," then conclusions based on using them might lead to errors. Note that errors are of two types:

1. The Type 1 error occurs when the researcher rejects the null hypothesis when the null hypothesis is true.
2. The Type 2 error occurs when the researcher fails to reject the null hypothesis when the null hypothesis is false.

IV. The Scientific Experiment Involves Drawing Conclusions

The films concludes showing the Three Stooges attempting to leave the party while behaving like "perfect gentlemen." Upon observing the aristocrats behaving like Stooges, Moe

remarks, “Gentlemen, this is our punishment for associating with the Hoi Polloi.” If indeed the Three Stooges are perfect gentlemen as a result of the treatment effect, do we accept or reject the null hypothesis?

Circle one:

1. Accept the null hypothesis.
2. Reject the null hypothesis.

Now let’s say you were wrong about the fact that the Three Stooges are in fact perfect gentlemen after the experimental treatment. They were just “pretending” to be gentlemen in order to fool you. If you had assumed that they had become in fact perfect gentlemen as a result of the treatment, did you commit a Type 1 or Type 2 error?

Finally, how would you test to be sure that the Stooges’ condition as ongoing members of the lowest strata of society was due to heredity?

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