

ACTIVITY 1.3

Do Cookies/Donuts Improve Memory? Errors in Methodology

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The objective of this activity is to get students to think critically about the methodology of an experiment. I start by allowing the first half of the students to come in during the passing period and then locking the door. The students who arrived early are told to grab a cookie (or donut) and start eating before class starts. (Note that students who are on special diets or who have food allergies may want to abstain from this activity.) Since I have a window in my door, the students often will taunt the other students who are locked out. Once the final bell rings, I open the door for the others, and usually will say something like, “I wondered where everyone was.” Throughout the experiment I often will call this group the “late” and the first group the “early” group. This frustrates them even more.

I start the class and tell everyone we are doing some psychological research and we need to have a “testing environment.” I tell the class I am going to prove that the consumption of cookies increases memory in students. The students with cookies are given the list of words that are in a sentence and also the answer sheet numbered to 16. I give them 2 minutes to memorize the words. As the time comes to an end I tell them, “When you’re ready, flip the paper over and write as many words as you can remember.” I give them about 2 minutes to write the words and then have them grade their own paper.

I then start giving the other list to the other students (no cookies) face down. I intentionally do not give them the paper to write the words down yet. Right after they start memorizing the words, I call my school phone. I feign being upset and yell into the phone. I pretend it is a friend telling me about a song on the radio, and then crank the song while the students are memorizing. I then go to the board and ask for students in the first group to yell out how many they got right.

After 2 minutes of memorizing, I tell students to immediately turn their papers over. I have not given them the paper to write the words on, so I



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rush around the room and “toss” the papers at them rudely. I tell them to write the numbers 1–16 before they start writing the words. Once they are done, they are told to give their papers to someone in the first group to grade. The graders are told to make sure the words are in the same form as on the list. The graders write the number correct and bring it up to me to do the statistics. The scores are written under “cookies” (which has a smiley face next to it) or “NO cookies” (frown), which has been on the board since the students walked into class.

I now look at the averages and talk about how obvious it is that cookies improve memory. I theorize that it is because of the glucose, since the brain needs glucose to run. I tell them that I am going to encourage the school to get cookies to students every day. Since the average scores are usually 15 for cookies and about 9 for the control group, I usually state that there’s no question the cookies improved students’ memory. At this point a lot of students start to raise their hands. I get them into small groups and tell them to come up with 10 different things that may have caused the difference in the two groups’ statistics. At this point I also bring out cookies I had saved for the second group

Reasons for the Differences Between Groups

1. The cookies group was told they were going to do better.
2. The no-cookies group may have been frustrated being locked out of the room.
3. The no-cookies group may have been intimidated by hearing the other groups’ scores.
4. The no-cookies group was treated poorly—called the “late” group, papers tossed at them, frown next to their group name.
5. The order of the words on the paper.
6. The distractions—phone, music, yelling of the scores.
7. Groups should never be organized so that the first half of those who arrive are placed in one group.
8. Students were told they were studying the same words, yet the no-cookies group was hearing 16s when it looked like their list only had 15.
9. The no-cookies group had a delay and then had to write numbers on their sheet.
10. The cookies group was told to turn over their papers and write the words in a more casual manner.



11. The cookies group graded their own papers.
12. The no-cookies group had words marked wrong if they had minor mistakes.
13. Since the cookies group shouted out their answers, some of them may have been lying about how many they really got right due to conformity.

Once we are done looking at the problems in the research, I introduce some aspects of statistics and hypothesis testing. I ask the students to come up with a possible hypothesis (i.e., that cookies cause improvement in memory). I then explain that statistics are used to test a hypothesis. I ask if the statistics would be the exactly the same between two groups if everything was done exactly right (random groups, same environment, same directions). Could all of the best students be randomly put into one group? I start writing numbers for the two groups (Group A–7.5 Group B–7.9) and asking if this is likely to happen. I am trying to get them to arrive at an early understanding of the numbers being so different that it is very unlikely it happened by chance, so this would then support the hypothesis. While my students are just using intuition and experience to conclude it is very unlikely one group would get 7.5 and the other 9.2, I then give some information about using statistics to describe the data and using statistics to draw conclusions or test hypotheses.

This activity is something the students will often refer to as we go through the concepts in the unit, and even at the end of the year study sessions. Sometimes we look at AP essays from prior years that include finding flaws in research, and I hear students say things like, “you cannot put all the first people in a group like we did in the cookie experiment.”

Word list (cookie group)**Word list (no cookie group)**

1. Students
2. Recall
3. Ability
4. Is
5. Influenced
6. By
7. Grouping
8. Familiar
9. Phrases
10. Together
11. Into
12. Memory
13. Area
14. Of
15. Your
16. Brain

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10. Ability
11. By
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13. Is
14. Brain
15. Familiar
16. Into

Answer Sheet

- | | |
|----|-----|
| 1. | 9. |
| 2. | 10. |
| 3. | 11. |
| 4. | 12. |
| 5. | 13. |
| 6. | 14. |
| 7. | 15. |
| 8. | 16. |

