Designing control conditions task

A common kind of question asked by psychologists is ‘does X have some kind of effect on Y’? Here are some examples:

1. Does meditation improve concentration?
2. Does Cognitive Behaviour Therapy (CBT) reduce depression?
3. Do brain-training games improve cognitive performance?

In each case, and for very many more complex questions in psychology, the challenge is to design a control condition against which to compare the experimental condition.

For example, suppose you want to know the answer to Question 1 above – *Does meditation improve concentration?* One thing you might do to test this idea is to give a group of participants some meditation to complete, perhaps over a number of weeks. Once they have completed their meditation program, you will then want to assess their concentration levels with some kind of test (e.g., something that measures sustained attention).

Crucially, to know whether the meditation program improved concentration, you need to know what *would have happened if the participants had not meditated*. That is, *you need a Control condition* against which to compare the Meditation condition.

In the Control condition, participants need to be treated in *exactly the same way* as the Meditation condition, except that there is no meditation. So the *only difference* between the two conditions is the meditation. That way, if the final test shows that concentration is better in the Meditation condition than in the Control condition, you know that it is because due to the meditation. There was no other difference in the way they were treated that could account for the difference in performance.

Your task

Below are five possible psychological phenomena or effects A-E. For each one, your task is to design a study that tests the idea. The study should include two groups of participants. One group will be the Experimental group that features the crucial variable (e.g., music, caffeine etc…). The second group will be the Control group which is exactly the same as the Experimental group, except that the crucial variable is absent.

Having said that, it is not usually possible for the Control group to be *exactly* the same except with respect to the variable of interest. But see how close you can get.

1. **Music and study.** Listening to music (e.g., Taylor Swift or Oasis) while revising makes study more effective – people remember and understand more.

*For ChatGPT:*

1. *One group of participants will study a text while listening to music through headphones. Another group will not have music.*
2. *The control group should be wearing headphones – in case that has an effect on their studying.*
3. *It’s also important to control for the noise in the headphones - it may be that the music is drowning out some background noise that is irritating. White noise is one possibility.*
4. *Perhaps it would be good to also control for the words in the songs. If the music group do perform better, it may be the words they are hearing, not the music. You could control for this by playing poetry through the headphones in the control group.*
5. *Also, it may not be the music, but having a rhythm helps. The control condition could have a beat played but no poetry. And this could be combined with some poetry, but no ‘music’. The question is, how can we keep everything in the control condition the same as in the music condition, but with no music?*
6. **Caffeine and mood.** People often say that they would have a miserable day without their morning cup of coffee because they need that caffeine hit.

*For ChatGPT:*

1. *All participants are coffee drinkers, some are given a coffee in the morning and some are not. Mood is then measured throughout the day.*
2. *The Control group should drink decaffeinated coffee.*
3. *The decaffeinated coffee that the Control group drink should be made by someone else – so that the Control group don’t immediately know that they haven’t had their caffeine. The person who made the coffee should also not know which is caffeinated and which is decaffeinated.*
4. *What if decaffeinated coffee tastes different? One solution would be to give decaffeinated coffee to both groups, and they also swallow a pill that does or does not contain caffeine.*
5. *It’s difficult because Control participants may be able to detect the lack of caffeine and so expect a crappy day. It wouldn’t be a direct effect of the caffeine, but an effect mediated by an expectation.*
6. **Associative learning.** If you present a neutral tone stimulus and then follow it immediately by electric shock, people will come to fear the previously neutral tone. On test, when participants show fear of the tone, it is thought to a tone-shock association in memory.

*For ChatGPT:*

1. *One group receives tone-shock pairings, the other doesn’t.*
2. *You also need to control for presentation of the shock – maybe just receiving shocks makes the participants more fearful.*
3. *You should also present the tone in the control condition – if the tone is unfamiliar on test (as it could be in the Control condition), that might affect the results.*
4. *One excellent approach is for the Control group to receive unpaired presentations of the tone and shock – the two stimuli are both presented, but at random times relative to each other. So the tone doesn’t predict the shock, as it does in the experimental condition.*
5. **Massed versus spaced encoding in memory**. If you want to do well in your exams, you may need to revise the material multiple times. If you revise a topic three times, you should make sure those three occasions are spread out over time. That will boost your memory more than revising the topic three times in quick succession. In this experiment, there are five topics to revise for the final exam. Assume that each topic is revised three times.

*For ChatGPT:*

1. *The Massed group will revise each topic three times in quick succession before being tested. The Spaced group will space their revision out over time.*
2. *That approach might mean that the Spaced group have to start their revision earlier. It would be best to make sure the two groups spend the same total amount of time revising.*
3. *It would also be best to make sure that both groups start revising at the same time.*
4. *Probably the best approach would be for both groups to have 15 revision sessions (five topics, three times each) in a row. The Massed group would revise Topic 1 then Topic 2 then Topic 3 etc. In the Spaced group, all the topics would be randomly allocated to the 15 revision sessions. That way, the revision of any given topic in the spaced group would be separated by revision of the other topics.*
5. **Physical and mental health**. Better physical health will reduce stress, anxiety and depression.

*For ChatGPT:*

1. *Take a group of physically healthy people and another group of physically unhealthy people and test them for stress, anxiety and depression.*
2. *The approach above would tell you if physical and mental health are associated, or correlated. But it wouldn’t tell you whether better physical health would improve mental health. It could be the other way round – maybe people with better mental health do more exercise. That is, maybe good mental health causes good physical health, rather than the other way around. Or maybe there is some other cause of both of these effects. For example, perhaps people who are richer do more exercise (because they can afford the gym membership etc.) and have better mental health (because they don’t have money worries).*
3. *The answer would be to stage an intervention, or run an experiment, in which half of the participants are required to engage in physical exercise and half are not. The prediction would be that those in the mental health of those in the Exercise condition would improve.*
4. *Alternatively, you could poison one group of participants. Those in the Poison group would be predicted to show a decline in mental health (due to the decline in their physical health).*