Experiments

Experiments are a particular kind of research involving the measurement of the consequences of an action.

If you want to know whether the way you dress has an influence on whether people believe you, you might try wearing different kinds of clothing and saying the same things to different people.

For example, wear ratty old clothes sometimes and very neat, clean, dressy clothes other times.

Then compare the responses of the people who saw you dressed neatly with those of the people who saw you dressed the other way.

If you want to know whether one brand of yeast makes the bread rise faster than another brand of yeast, you might make two batches of bread dough, each with one of the two brands.

Then watch what happened over the next hour or two, taking particular note of how much each batch of dough rises.

These are experiments, although they are informal and imprecise.

They aren't what are known as “laboratory experiments.”

In a laboratory experiment, you would control as many of the things that could interfere with the results as you could.

If you wanted to turn the first example described above into a laboratory experiment, you would want to standardize the situation in which you observe people's responses to what you say so that the only thing that varied from one time to the next was what you wore....

You would have two "conditions" – in one you wear ratty old clothes, and in the other you wear very neat, clean, dressy clothes.

You'd want the only difference between the conditions to be which kind of clothes you wear. Other than that, everything else would be the same.

For example,

- the experiment would always take place in the same setting, you would always say the same things,
- you would assess the extent to which they believe you in the same way,
- the people you spoke to would always approach their interaction with you from the same perspective or with the same purpose in mind, and so on.
- There would never be any disturbances that could distract the people you were interacting with.

The easiest way to control all of these factors is to conduct the experiment in a special room from which the potential disturbances have been removed—a "laboratory."

You can probably see how conducting the research in your specially-prepared room will eliminate many potential disturbances, but you may still be wondering about how you can control for all the things that make each person unique.

One strategy that some researchers attempt to use is called "matching."

The people who participate in the experiment are paired with people very similar to themselves (same age, same sex, same education, etc).

Then one member of each pair sees you wearing ratty old comfortable hanging-out clothes and the other sees you wearing more formal attire.

An easier and much more effective approach is to randomly assign people to conditions.

In the same way that random selection makes your sample representative and eliminates bias, randomly assigning people to conditions automatically matches the groups much more completely than the laborious strategy of matching people in pairs.

For one thing, random assignment controls for all possible kinds of differences between people, while the matched pairs strategy only controls for the differences you are able to observe, and only when you are able to find appropriate matches for all of the people in your study.

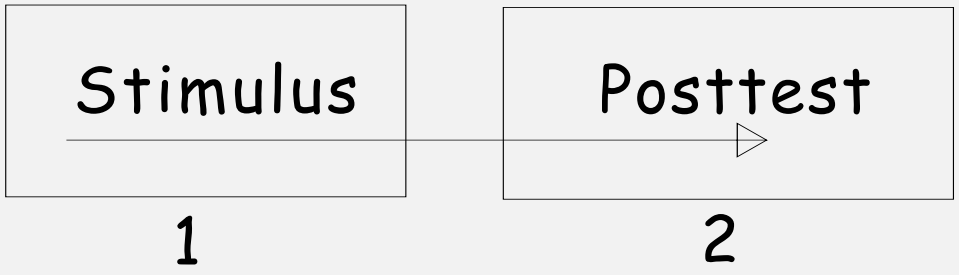
Not-quite Experiments

None of these are actually experiments because they are all missing one or more of the important logical components that give experiments their explanatory power.

- One-Shot case study
- One-group Pretest-Posttest
- Static-Group

One-Shot case study (only one condition)

You do something to the members of one group and see what happens.

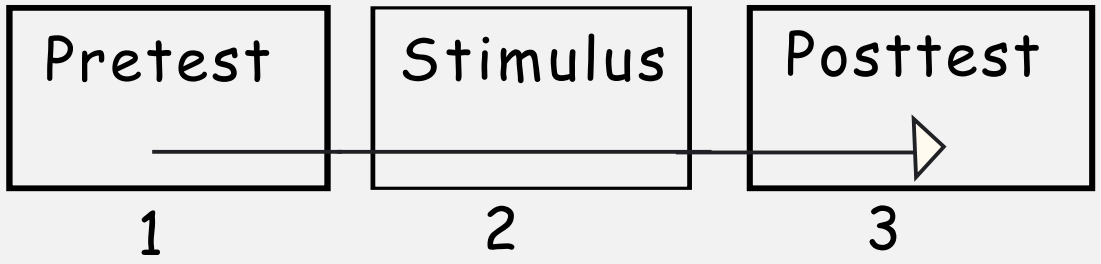


The main weakness of the One-Shot case study is that you don't know whether it was what you did (the stimulus) or something else that caused what you saw in the Posttest.

Furthermore, you have nothing to compare the results of your measurement with.

One-group Pretest-Posttest (still only one condition)

With this approach, you take a measurement (the Pretest) before you apply the stimulus as well as one afterwards (the Posttest).



This design lets you determine whether or not there has been a change between the results of the two measurements....

but you still can't tell whether the change was due to the stimulus.

Still nothing to compare the results of your measurement with.

To get any information about whether the change was due to the stimulus,

you need to add a second condition — a group that doesn't receive the stimulus.

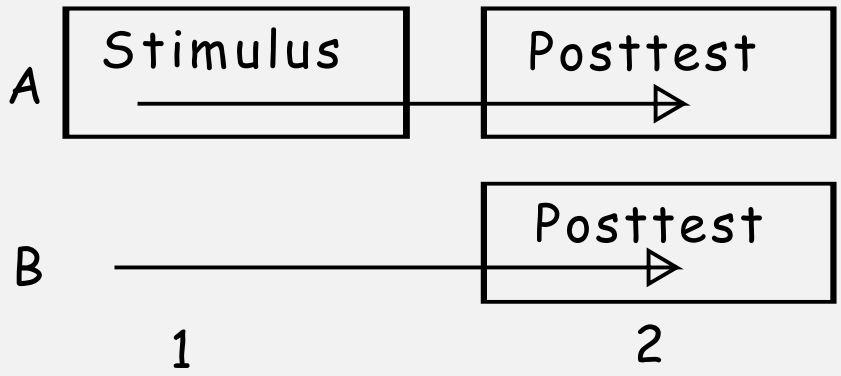
This is the purpose of the Control Group

Static-Group comparison (condition might differ)

Here you have two groups,

one receives the stimulus and the other doesn't,

you do a posttest measurement on both and compare the results.



While you can compare the cases that were exposed to the stimulus with those that weren't, you still can't rule out the possibility that something else caused any differences you saw. Perhaps the two groups were different to begin with.

The "classical experiment"

It has three minimum components:

- random assignment of people to one of two conditions;
- the people in one condition are treated differently from those in the other condition;
- measurements or observations are made after the people have been exposed to the treatments.

The goal of experimental research is to determine what effect the independent variable has on the dependent variable.

The independent variable is controlled by determining which condition the person is assigned to. (In the example above, your style of dress is the independent variable.)

The dependent variable is what you measure or observe; it is what you expect to be affected by the independent variable. (In the example above, this is the extent to which the people believe what you say.)

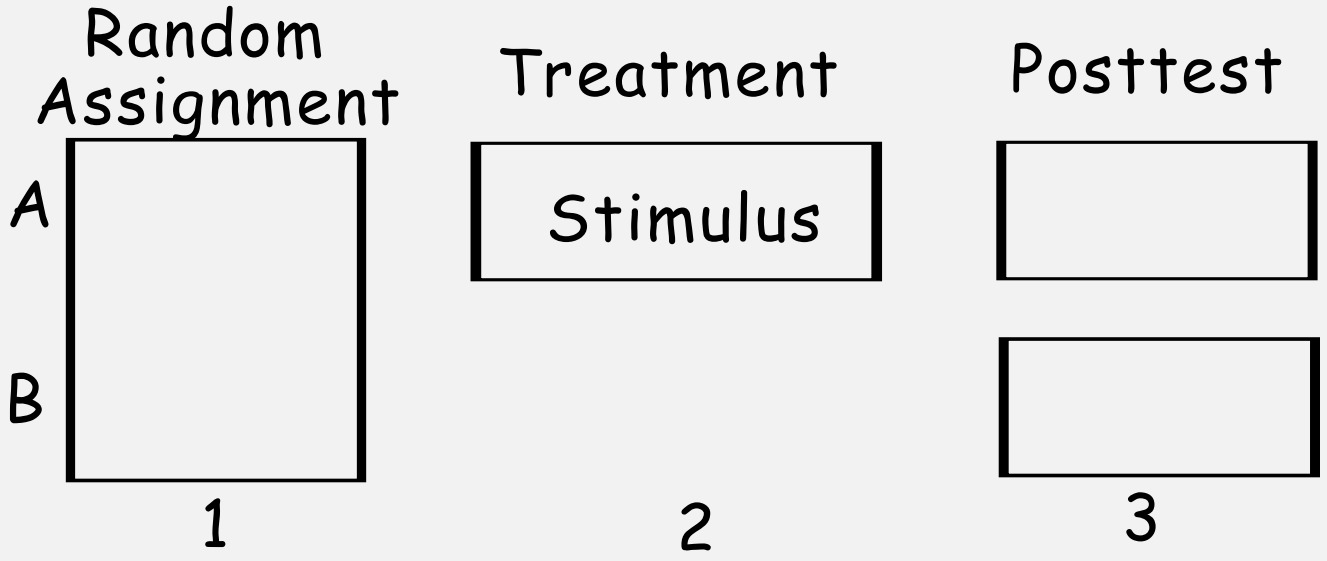
The independent variable is the cause and the dependent variable is the effect.

Here is the simplest experiment, the Two- Group Posttest

You randomly assign people to one of two groups;

one group receives the stimulus;

you do posttest measurements in both groups.



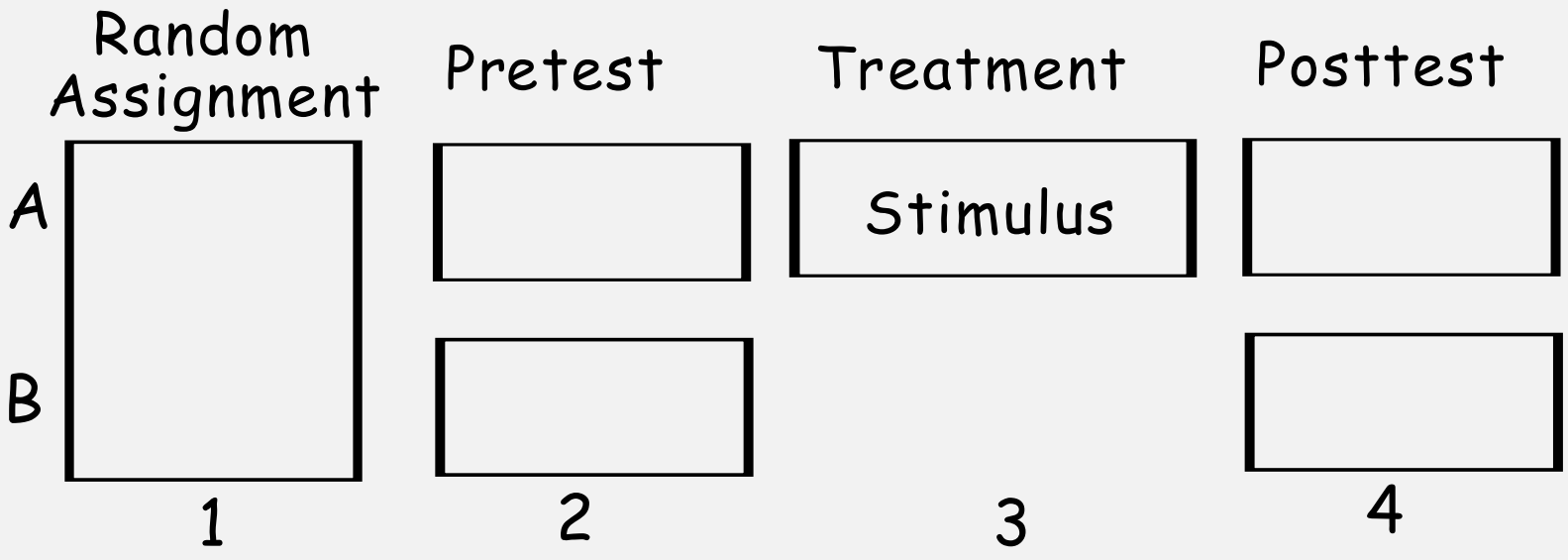
Here is a slightly more complex design, the Two- Group Pretest-Posttest

You randomly assign people to one of two groups;

you do pretest measurements in both groups.

one group receives the stimulus;

you do posttest measurements in both groups.



This design, called a "two-group, pretest-posttest" design, adds a test to see if the two groups were the same before the treatment.

The pretest is a check on the validity of the random assignment to conditions.

While randomly assigning individuals to conditions should make the two groups comparable, there is a possibility that they may turn out to be different (think sampling variability).

The pretest has another, equally important, goal, which is to allow you to perform before-and-after comparisons on the subjects in your experiment.

Four-group Designs

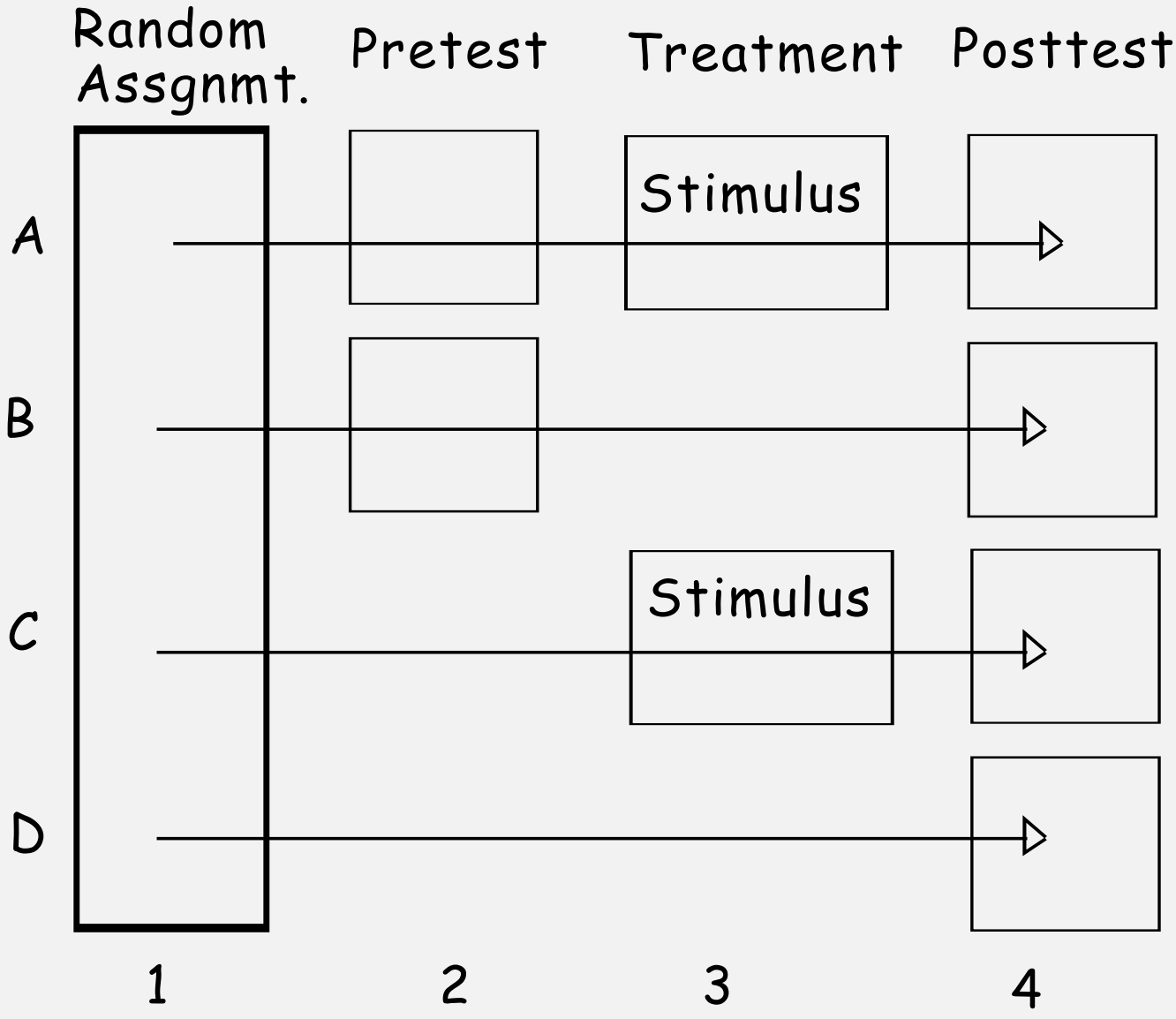
Sometimes there is a concern that the pretest may influence the performance or behavior of the people you are studying.

For example, the pretest may get people to thinking about the content of the experiment, or it may make them more aware of certain things than they would ordinarily be.

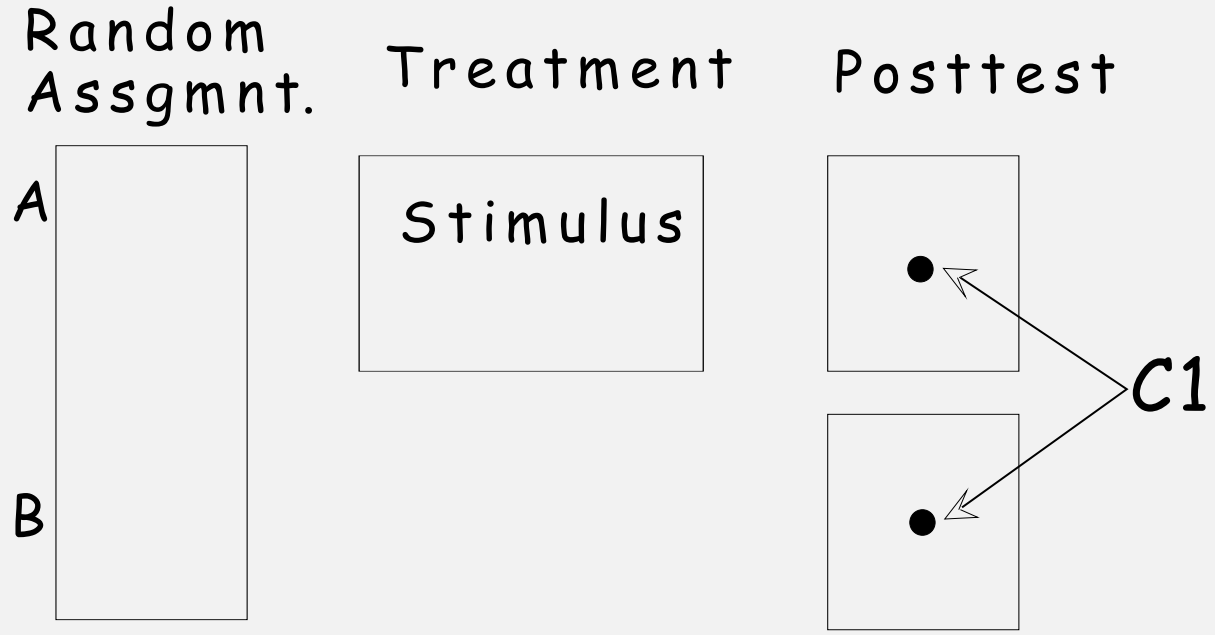
To control for this, a two-group posttest only design might be added to the two-group pretest-posttest design.

The result is what is known as the "Solomon four-group" design

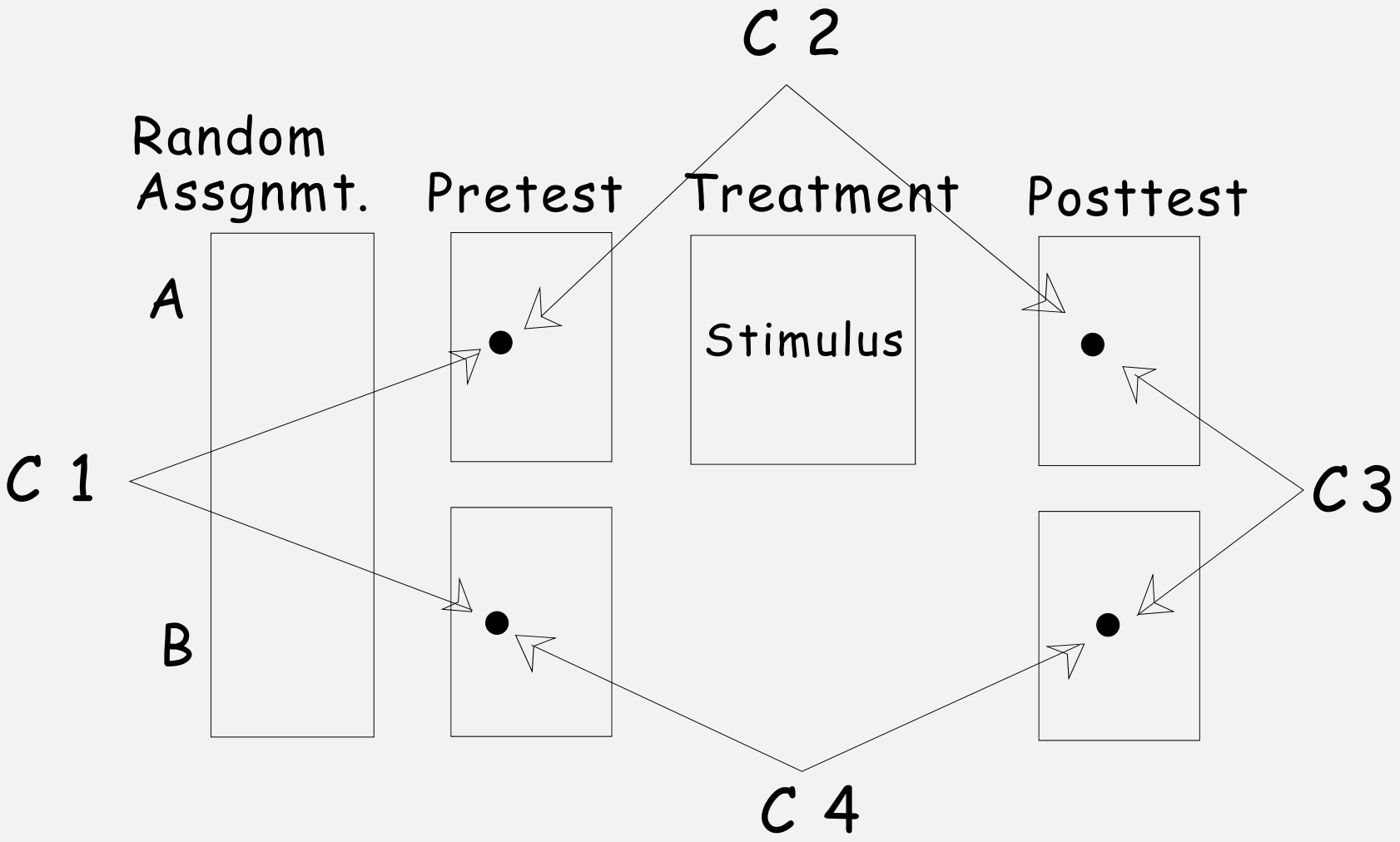
Solomon-Four Group

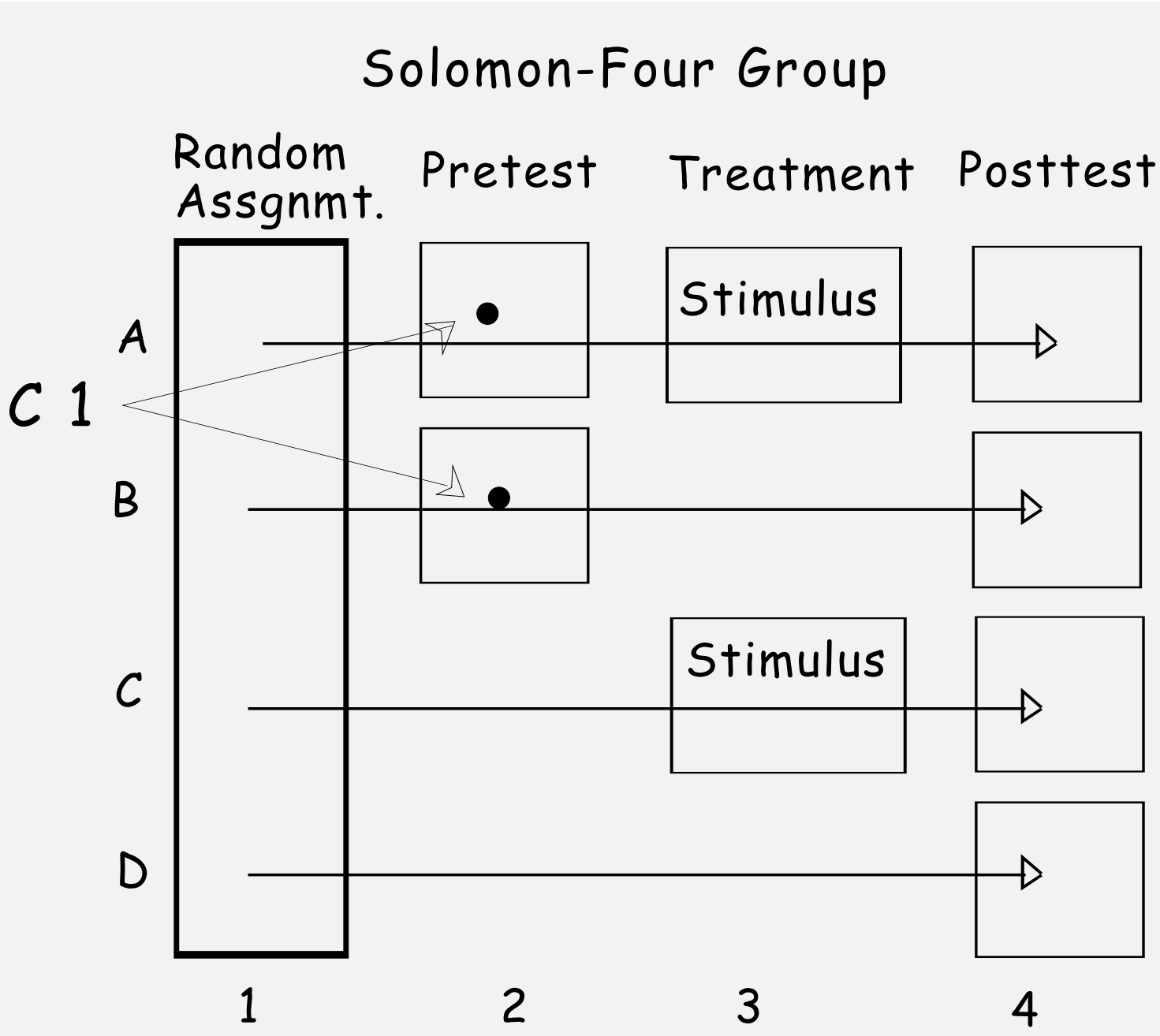


Two-Group Posttest Comparison



Two-Group Pretest-Posttest Comparison




Solomon-Four Group
Random Assgnmt.
Pretest
Treatment
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A
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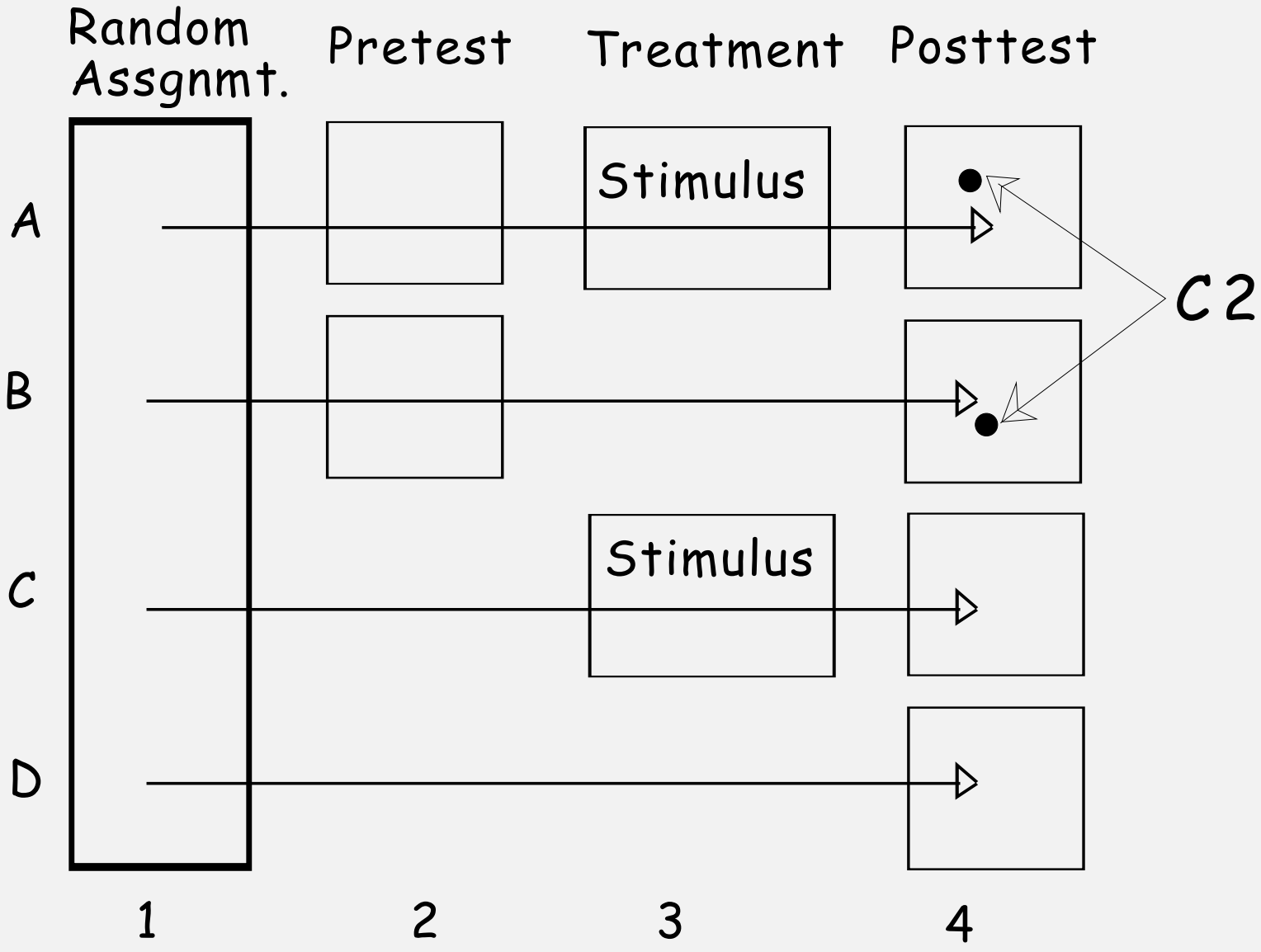
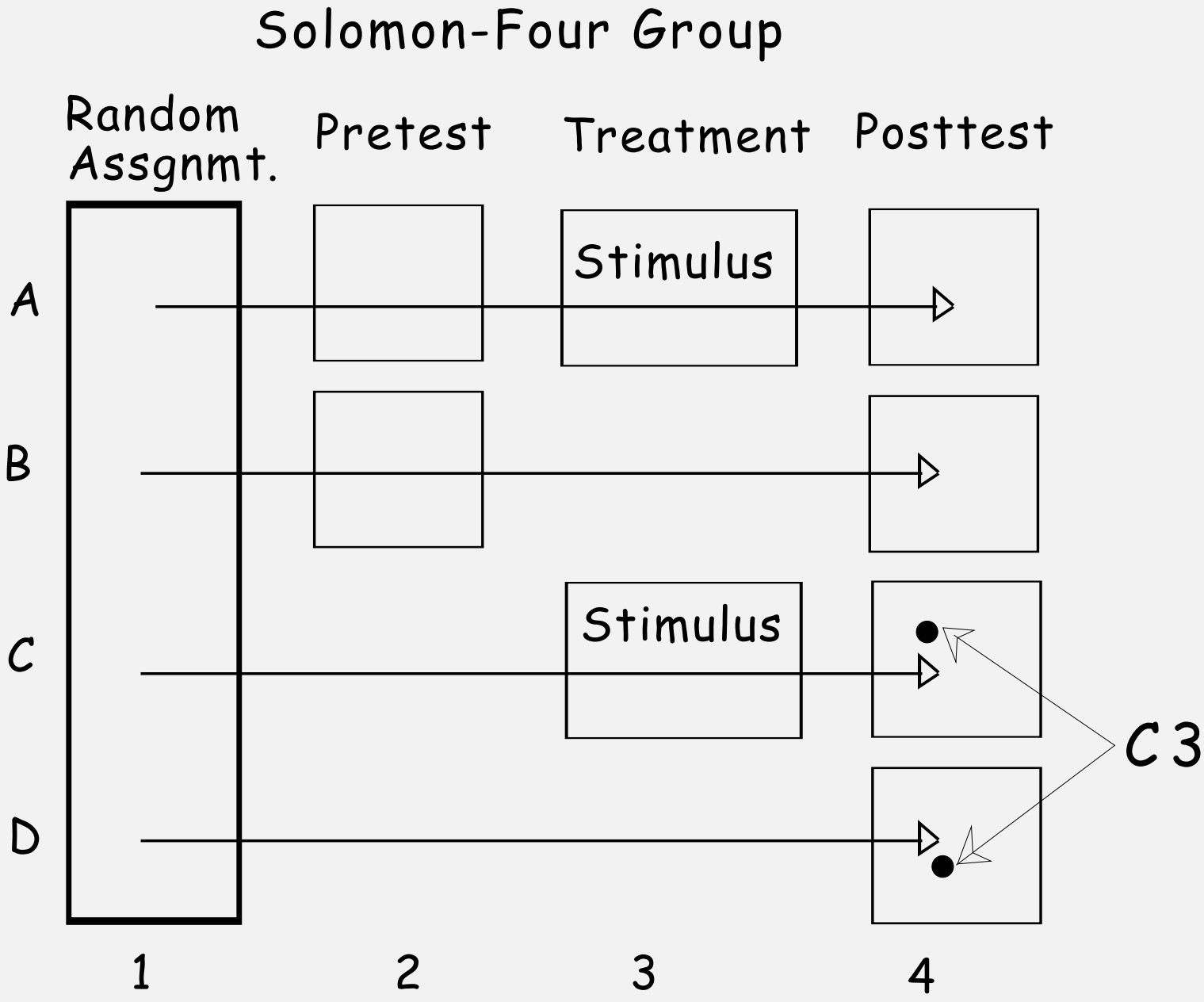
Solomon-Four Group




Solomon-Four Group
Random Assgnmt.
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Posttest
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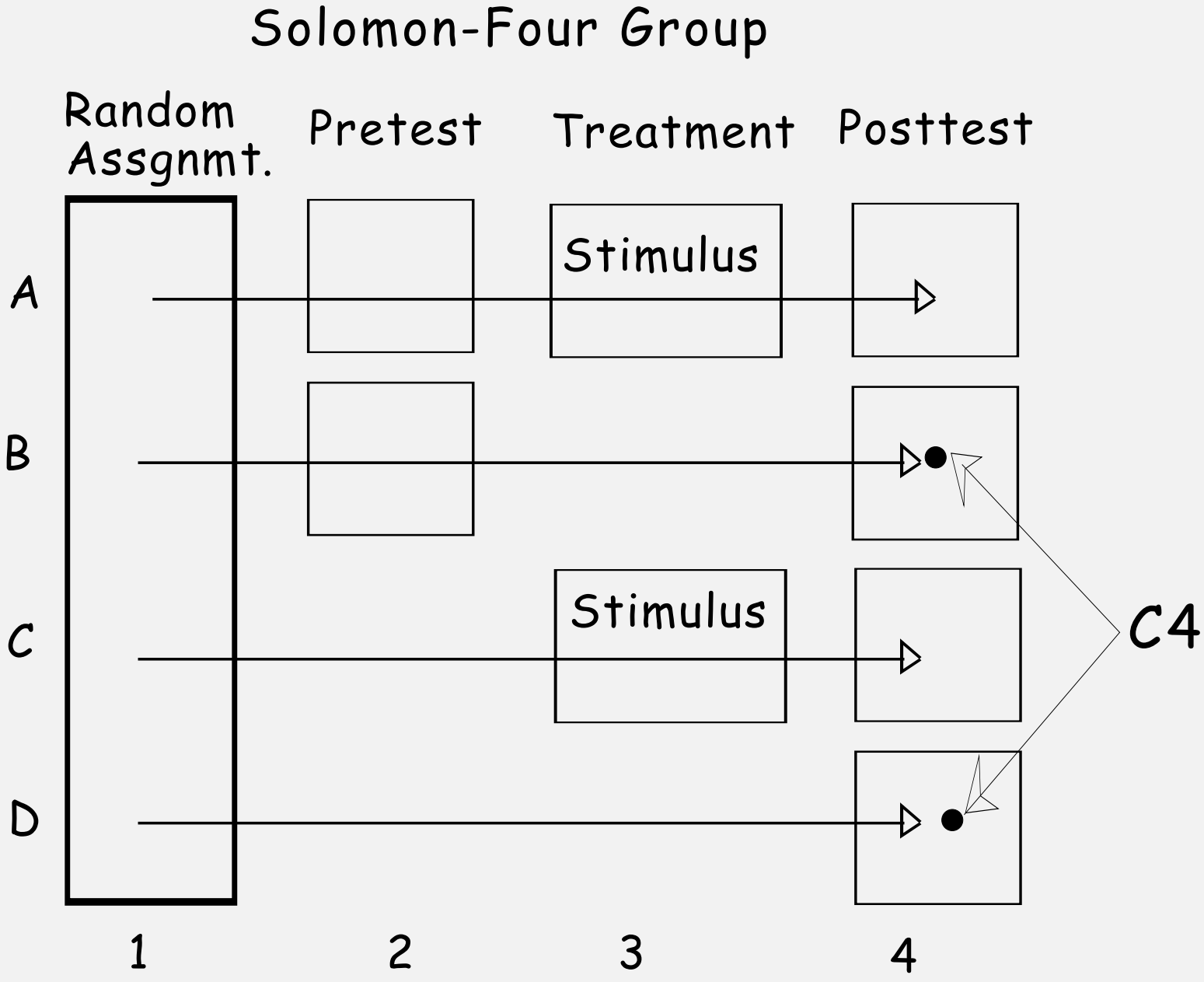
Solomon-Four Group
Random Assgnmt.
Pretest
Treatment
Posttest
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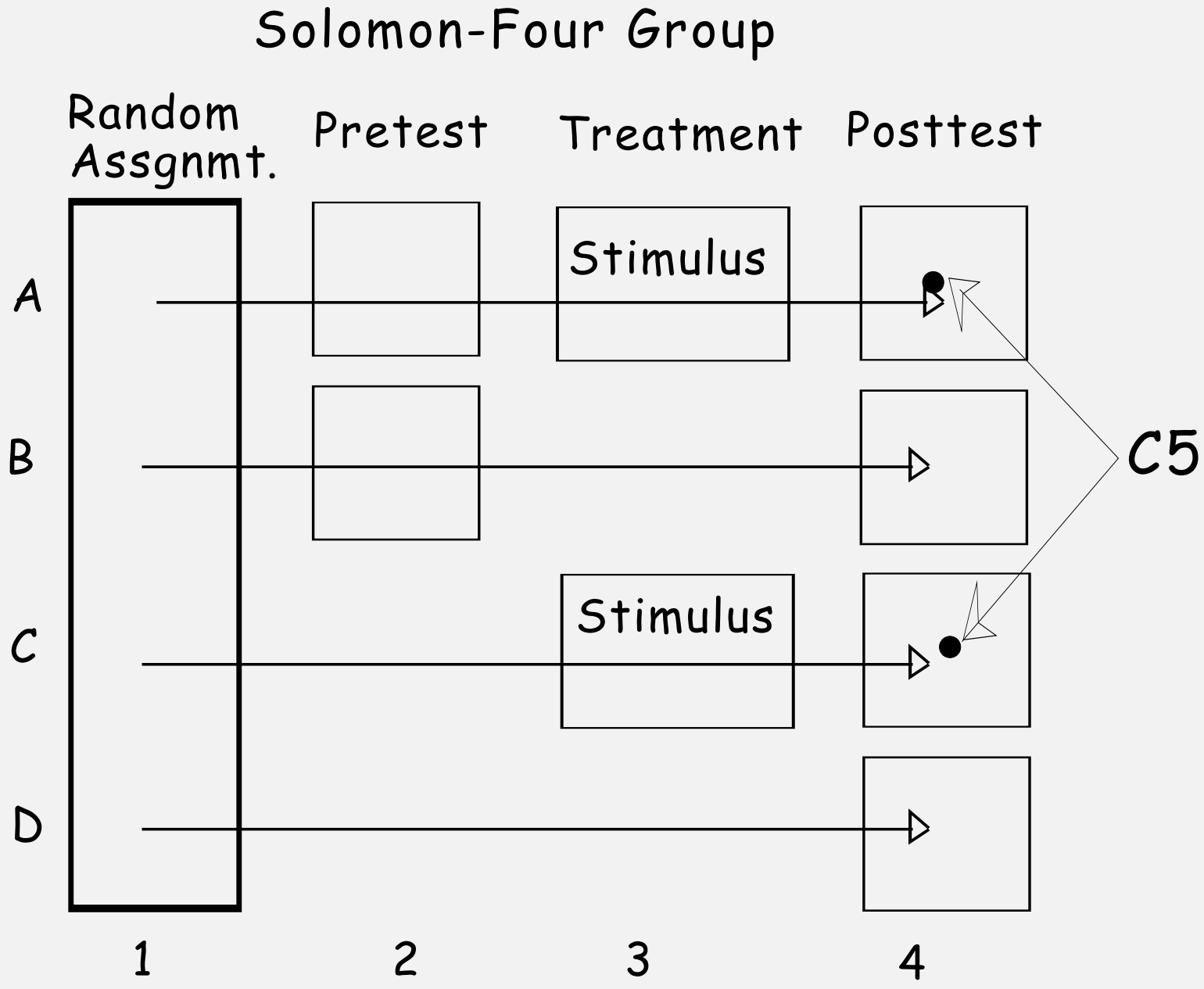
Solomon-Four Group
Random Assgnmt.
Pretest
Treatment
Posttest
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Solomon-Four Group