

METHODOLOGICAL SCIENTIFIC KNOWLEDGE

Joachim Marschall, Lukas Otto, Marion Rahnke, Michaela Maier

Please cite as:

Marschall, J., Otto, L., Rahnke, M. & Maier, M. (2011). Methodological scientific knowledge. Unpublished instrument. Retrieved from <http://www.uni-koblenz-landau.de/landau/fb8/ikms/ikm/forschung/wiskom>

1. Please think about the following situation. Two scientists want to know if a certain drug is effective against high blood pressure. They both found 1000 people with high blood pressure willing to participate in a study.

The first scientist wants to give the drug to all 1000 people with high blood pressure and see how many experience lower blood pressure levels.

The second scientist wants to give the drug to 500 people with high blood pressure, and not give the drug to the other 500 people, and see how many in each group experience lower blood pressure levels.

From a scientific viewpoint, which is the better way to test this drug and why? Please choose one of the following answers:

- ☐ It is better to give the drug only to 500 people. In case of severe side effects, less people will be affected.
- ☐ It is better to give the drug to all 1000 people. If it turns out to be effective, this is proved by a greater number.
- ☐ It is better to give the drug to 500 people, and not to the other 500 people. Only this way, lower blood pressure levels can be attributed to the treatment with a high degree of certainty.
- ☐ It is better to give the drug to all 1000 people, since it would be unethical to withhold a drug from people who need it.

2. Please think about the following situation. A scientist wants to know if a certain drug is effective against high blood pressure. She found 400 people with high blood pressure willing to participate in a study, whom she divides into two groups: 200 people receive the drug, while the other 200 people do not receive the drug. The scientist then tests how many in both groups experience lower blood pressure levels.

From a scientific viewpoint, which would be the better way to decide which patient should be assigned to which group? Please choose one of the following answers:

- ☐ Those people with the highest blood pressure levels should be assigned to the group receiving the drug. If it works on them, it will work on any other person with high blood pressure.
- ☐ Those people with moderately elevated blood pressure levels should be assigned to the group receiving the drug. That way it will be easier to see if the drug has any effect at all.
- ☐ People at risk (children, seniors, and pregnant women) should be assigned to the group receiving the drug. It would be unethical not to treat them.
- ☐ People should be randomly assigned to the groups, because otherwise the results would be distorted.

3. Please think about the following situation. Two scientists have both done a study, both of which show that a certain drug is effective against high blood pressure.

The first scientist wants to conduct another study, in order to test the effectiveness of the drug again. The second scientist encourages all his patients to take the drug on a regular basis.

From a scientific viewpoint, which would be the recommended approach? Please choose one of the following answers:

- ☐ The first scientist is right: A single study is not enough. Before arriving at a conclusion, one has to test the effectiveness of the drug again.
- ☐ The second scientist is right: Once the effectiveness of a drug has been proven in a study, it should be applied to practice as soon as possible in order to spare people further suffering.

4. Please think about the following situation. A scientist wants to know if a certain drug is effective against high blood pressure. She found 400 people with high blood pressure willing to participate in a study, whom she divides into two groups: 200 people receive the drug from their family doctor, while the other 200 receive a similar looking drug with no active ingredients (a so-called placebo).

From a scientific viewpoint, who should be informed about which patient receives the actual drug and which patient receives the placebo? Please choose one of the following answers:

- ☐ The patients have to be informed if they receive a tablet without active ingredients, so they can give their consent. After all, it is not permissible to lie to them.
- ☐ The patients' family doctors should know whether they receive the drug or a placebo. Since they know their patients, this will help them to interpret the results.
- ☐ Neither the patients nor their family doctor should know which group they have been assigned to. Only the scientist has to know this for her analysis.

5. Please think about the following situation. A doctor has to tell a couple that their genetic makeup means that they have a one-in-four ($1/4$) chance of having a child with an inherited illness.

What does this mean for the offspring of this couple? Please choose one of the following answers:

- ☐ If they have only three children, none will have the illness.
- ☐ If their first child has the illness, the next three will not.
- ☐ Each of the couple's children has the same risk of suffering from the illness.
- ☐ If their first three children are healthy, the fourth will have the illness.

The correct answers are:

- 1.: c
- 2.: d
- 3.: a
- 4.: c
- 5.: c