

A hypothesis is a statement used by geographers to highlight what geographical phenomenon they will be testing through their research. Unlike a title, which is often framed as a question, a hypothesis makes a prediction or suggestion as to what the outcome of the research might be. This prediction is usually based on the knowledge and understanding which the researcher already has.

A hypothesis allow the geographer to focus on a particular aspect of the data or variables being investigated and is a key part of empirical-based research. Research without hypotheses and hypothesis testing as part of its structure tends to be more open and organic in the direction it takes and it often confined to topics where there is very little prior knowledge on which to base predictions.

Geographers tend to use pairs of hypotheses referred to as **alternative** (written as H_1) and **null** (written as H_0) hypotheses. An alternative hypothesis states that there will be some kind of relationship, pattern or correlation in the data under investigation while a null hypothesis states there will be none. The null hypothesis has a very important role. Geographers deal with multiple, messy and often contradictory variables. To prove, to absolute truth, that the reason why the flow rate of a river increases is due to an increase in the channel depth is short-sighted. In reality, there could be multiple other reasons why the flow rate might increase (to name but one, an increase in gradient for example). Therefore it is impossible to prove accept an alternative hypothesis to be true.

However, a null hypothesis, states there is no relationship, pattern or correlation - something which is much easier to disprove as only one piece of contradictory evidence is needed in order to reject it. Therefore geographers use null hypotheses as a way of showing that results may *indicate* a certain result while also acknowledging that there will undoubtedly be other factors that need to be considered before absolute truth is declared.

A second way of considering hypothesis testing is whether the hypothesis is one or two tailed. A **one tailed hypothesis** is a directional hypothesis as it makes a suggestion as to what direction an outcome will take. These tend to be used when the researcher knows that it is highly likely that there will be a correlation between the variables.

A **two tailed hypothesis** is a non-directional hypothesis as it allow for a prediction of the outcome but not precisely what that outcome might look like. Therefore these tend to be used when the geographer does not know if there is likely to be a correlation or not.

Empiricism is the philosophical idea that new knowledge comes from sensory experiences. For example, we can observe and record data (or 'empirical evidence') that would support the idea that a river's flow would increase as the depth of the river channel increases. Rationalism on the other hand is the philosophical idea that new knowledge comes from reason and logic. For example, we know that the deeper the river channel the more water there will be flowing in the centre of the channel where it would be unimpeded by the force of friction on the channel sides. Logic and reasoning would therefore tell us that because friction slows down the flow rate, the deeper the channel, the faster the flow rate will be.

In practice, geographers use both rational and empirical thinking when they conduct research. This is most clearly highlighted by the way in which they use hypotheses.

One tailed hypotheses:

- H_1 As the river deepens, the flow rate will increase.
- H_0 As the river deepens, the flow rate will not change.

Two tailed hypotheses:

- H_1 There will be a significant correlation between the flow rate and the depth of the river.
- H_0 There will be no significant correlation between the flow rate and the depth of the river.