

Alternative hypothesis

In medicines development one might for example formulate the hypothesis that a new treatment for a disease is better than the existing standard of care treatment. If the new treatment is called 'B', and the standard of care treatment is called 'A' then the hypothesis states that 'B' is better than 'A'. **This hypothesis would be referred to as the alternative hypothesis.** It is also known as the 'research hypothesis'.

The concept of the alternative or research hypothesis is a central part of formal hypothesis testing.

One might presume that scientists would set about proving the alternative or research hypothesis (B is better than A), but that is not the case. Instead this objective is approached indirectly. Rather than trying to prove the alternative or research hypothesis, scientific method assumes that in fact B does not differ from A – that the new treatment does not offer an improvement over the standard of care treatment. This is known as the null hypothesis.

In order to understand why scientific method adopts this indirect approach in hypothesis testing it may be useful to bear in mind what Albert Einstein said: 'No amount of experimentation can ever prove me right; a single experiment can prove me wrong.'

So, scientists use statistical tests to determine if the null hypothesis is true or false. If they can show with a certain likelihood (probability) that the null hypothesis is false, then the alternative or research hypothesis would be adopted (must be true); in this example it means that the new treatment is better than the standard of care treatment.