

8.4: The Alternative Hypothesis

If the null hypothesis is rejected, then we will need some other explanation, which we call the alternative hypothesis, H_A or H_1 . The alternative hypothesis is simply the reverse of the null hypothesis, and there are three options, depending on where we expect the difference to lie. Thus, our alternative hypothesis is the mathematical way of stating our research question. If we expect our obtained sample mean to be above or below the null hypothesis value, which we call a directional hypothesis, then our alternative hypothesis takes the form:

$$H_A : \mu > 7.47 \quad \text{or} \quad H_A : \mu < 7.47$$

based on the research question itself. We should only use a directional hypothesis if we have good reason, based on prior observations or research, to suspect a particular direction. When we do not know the direction, such as when we are entering a new area of research, we use a non-directional alternative:

$$H_A : \mu \neq 7.47$$

We will set different criteria for rejecting the null hypothesis based on the directionality (greater than, less than, or not equal to) of the alternative. To understand why, we need to see where our criteria come from and how they relate to z -scores and distributions.

Writing hypotheses in words

As we alluded to in the null hypothesis section, we can write our hypotheses in word statements (in addition to the statements with symbols). These statements should be specific enough to the particular experiment or situation being referred to. That is, don't make them generic enough so that they would apply to any hypothesis test that you would conduct.

Examples for how to write null and alternate hypotheses in words for directional and non-directional situations are given throughout the chapters.

Contributors and Attributions

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