

The CLEAR Framework

For Interpreting Words Used in Statistical Claims

C	L	E	A	R
Causal Language	Level of Associative Language	Evidence of Possibility Language	Assessment of Claim-based Language	Repeatability and Measurability

The CLEAR Framework offers a structured approach to dissecting the language of statistical claims, providing clarity on the level of support each claim holds. Examining the specific words and phrases used allows us to better understand the implications and evaluate the reliability of the information presented. Let's delve into the components of this framework and how they can be applied in real-world scenarios.

C - Causal Language Causal language asserts a direct cause-and-effect relationship between variables, such as "causes," "leads to," or "results in." Claims using causal language suggest a strong link but require robust evidence to be credible.

L - Level of Associative Language Associative language indicates a correlation or relationship between variables without implying causation. Words like "linked to," "associated with," or "correlated with" suggest a connection that warrants further exploration.

E - Evidence of Possibility Language Possibility language introduces a potential relationship or effect, often based on preliminary findings or hypotheses. Terms such as "may," "could," or "might" signify a less certain claim and the need for additional research.

A - Assessment of Claim-Based Language Claim-based language relies on assertions that may lack solid evidence, such as "claimed to," "alleged to," or "reported to." When encountering claim-based language, it's essential to critically evaluate the source and supporting evidence.

R - Repeatability and Measurability Repeatability refers to whether the outcome can occur multiple times for the same individual, while measurability assesses whether the outcomes can be quantified before and after the event or condition in question. Claims with repeatable and measurable outcomes tend to have stronger support.

Causal Language (Strong Support)

Words / Phrases: "Causes," "Leads to," "Results in"

Implication: Direct cause-and-effect relationship

Evaluation

- Look for robust evidence, such as randomized controlled trials, to support causal claims.
- Evidence Source. Is the evidence provided from a reliable and unbiased source? Are the findings published in a reputable scientific journal or presented by a credible organization?
- Confounding Variables. Were there any confounding variables that could have affected the results? Has the study adequately controlled for these variables to isolate the causal effect?
- Effect Size. How strong is the causal relationship? Is the effect size substantial enough to be practically significant?
- Alternative Explanations. Are there any alternative explanations for the observed effect? Has the study addressed potential alternative causes?
- Reproducibility. Can the results be reproduced in other studies or under different conditions? Reproducibility strengthens the credibility of causal claims.
- Temporal Sequence. Does the cause precede the effect in time? A proper temporal sequence is essential for establishing causation.

Associative Language (Moderate Support)

Words / Phrases: "Linked to," "Associated with," "Correlated with"

Implication: A relationship between variables, but not necessarily causal

Evaluation

- **Consistency Across Studies.** Is the association consistent across different studies? Consistency strengthens the credibility of the association.
- **Control for Confounding Factors.** Does the study control for other factors that could influence the relationship? Proper control for confounding variables is crucial for establishing a valid association.
- **Measurement Method.** How was the association measured, and is the measurement method reliable? The reliability of the measurement method affects the validity of the association.
- **Strength of Association.** How strong is the association? A stronger association provides more support for a potential relationship.
- **Biases.** Are there any potential biases in the study that could affect the association? Identifying and addressing biases is important for accurate interpretation.
- **Correlation vs. Causation.** Does the study clarify that correlation does not imply causation? It's important to remember that an association does not necessarily mean that one variable causes the other.
- **Temporal Sequence.** Does the cause precede the effect in time? A proper temporal sequence is essential for establishing causation.

Possibility Language (Weak Support)

Words / Phrases: “May,” “Could,” “Might”

Implication: Suggests a potential relationship or effect, but with uncertainty

Evaluation

- **Strength of Evidence.** How strong is the evidence supporting the possibility? Is the evidence based on preliminary findings or well-established research?
- **Level of Uncertainty.** What is the level of uncertainty associated with the claim? Are the researchers transparent about the limitations of their findings?
- **Conflicting Findings.** Are there any conflicting findings in other studies that challenge the claim? How does the claim hold up in the context of the broader research landscape?
- **Research Design.** What type of research design was used to arrive at the claim? For example, are the findings based on observational studies, which may have higher uncertainty, or experimental studies, which can provide more definitive evidence?
- **Contextual Factors.** Are there any contextual factors or conditions under which the claim would not hold? Understanding the context can help assess the generalizability of the claim.
- **Further Research.** Is further research needed to confirm the likelihood of the claim? Claims using possibility language often require additional studies to establish a more definitive conclusion.

Claim-Based Language (Very Weak Support)

Words / Phrases: "Claimed to," "Alleged to," "Reported to"

Implication: Based on claims or reports, often without solid evidence

Evaluation

- Is the source of the claim reputable, and do they have expertise in the subject matter?
- Are there any financial, political, or personal interests that might influence the claim?
- Has the claim been independently verified or corroborated by other sources?
- Are there any specific details or data provided to support the claim, or is it vague?
- How does the claim compare with the consensus in the field or with other studies?

Ambiguous or Vague Language (Unclear Support)

Words / Phrases: "Some evidence suggests," "Might be related," "Could play a role"

Implication: Unclear or non-specific relationship or effect

Evaluation

- Clarify Ambiguity. How can the ambiguous language be made more specific to provide clearer insight?
- Contextual Understanding. What additional context is needed to fully understand the claim?
- Precision of Terms. Are there any terms that need to be defined or clarified to avoid misinterpretation?
- Source of Ambiguity. Is the ambiguity intentional to mask weak evidence, or is it due to the complexity of the data?
- Impact on Interpretation. How does the use of ambiguous or vague language affect the overall interpretation of the claim?

Repeatability and Measurability (Contextual Support)

Repeatability

Evaluate if the outcome can occur multiple times for the same individual. Claims with outcomes that are not repeatable for a given person (e.g., "Soft Drinks Could Boost Pancreatic Cancer Risk") tend to have weaker support compared to claims involving repeatable outcomes.

Evaluation

- Can the observed outcome be repeated under similar conditions or in multiple studies?
- Are there any factors that might limit the repeatability of the outcome?

Measurability Before and After

Assess whether the outcomes can be measured both before and after the event or condition in question. Claims with outcomes that can be measured in this way (e.g., "Shooter video games can improve decision making") generally provide stronger support, especially if there is a control group involved (e.g., a placebo-controlled study).

Evaluation

- How are the outcomes measured, and are the measurement tools reliable and valid?
- Can the outcomes be quantified in a way that allows for a clear comparison before and after the event or condition?

Quick Tips for Evaluating Statistical Claims

When encountering statistical claims, keep the following key points and questions in mind to help you navigate the language and assess the strength of the evidence:

1. Identify the type of language used

1. Is the claim using causal language (e.g., "causes," "leads to")? This suggests a strong, direct relationship between variables.
2. Is the claim using associative language (e.g., "linked to," "associated with")? This implies a correlation but not necessarily causation.
3. Is the claim using possibility language (e.g., "may," "could," "might")? This indicates a potential relationship but with less certainty.

2. Assess the credibility of the source

1. Is the claim coming from a reputable source, such as a well-established scientific journal or a respected research institution?
2. Does the source have expertise in the relevant field?
3. Are there any potential biases or conflicts of interest that could influence the claim?

3. Consider the repeatability and measurability of the outcomes

1. Can the outcome be repeated multiple times for the same individual? Claims with repeatable outcomes tend to have stronger support.
2. Can the outcomes be measured before and after the event or condition in question? Measurable outcomes provide a clearer picture of the claim's validity.

4. Look for supporting evidence

1. Does the claim provide specific data, statistics, or research findings to back it up?
2. Are there references to studies or experts that support the claim?
3. Is the evidence from reliable and unbiased sources?

5. Evaluate the context and limitations

1. Does the claim apply to a specific population or context, or is it being generalized?
2. Are there any limitations or caveats mentioned regarding the claim's applicability?
3. Do other sources or studies provide a different perspective or contradictory evidence?