

## Methodology: Experiment

	Exemplary 4	Proficient 3	Marginal 2	Unacceptable 1
Research Question Necessity	<ul style="list-style-type: none"> <li>• The research question is clearly identified and stated in the paper. Moreover, it is highly significant and interesting.</li> <li>• The question is novel, or it is a significant extension of an existing question.</li> <li>• It is researchable and has an appropriate scope.</li> </ul>	<ul style="list-style-type: none"> <li>• The research question is identified but is stated in an unclear manner.</li> <li>• The question is significant, novel, or it is an extension of an existing question.</li> <li>• It is researchable and has an appropriate scope.</li> </ul>	<ul style="list-style-type: none"> <li>• The research question is identified but stated in an unclear manner.</li> <li>• The question is overall significant, novel, or it is an extension of some parts of an existing question.</li> <li>• It is overall researchable, but the scope is too broad or too narrow.</li> </ul>	<ul style="list-style-type: none"> <li>• The research question is identified and stated in the paper, but it is unresearchable or not novel, or even erroneous.</li> </ul>
Hypothesis Formulation	<ul style="list-style-type: none"> <li>• The proposed hypotheses are precisely identified and stated in the paper.</li> <li>• They are meaningful, testable, and falsifiable.</li> <li>• They are highly relevant to the research question, and clearly identify the variables and their relationships at a high level.</li> <li>• They are highly tied to theories, and the predictions of the hypotheses are reasonable.</li> </ul>	<ul style="list-style-type: none"> <li>• The proposed hypotheses are testable and falsifiable but stated in an unclear manner.</li> <li>• They are relevant to the research question, but lacking some details in identifying the variables and their relationships.</li> <li>• They are tied to theories to some extent, and the predictions of the hypotheses are reasonable.</li> </ul>	<ul style="list-style-type: none"> <li>• The proposed hypotheses are testable and falsifiable but stated in an unclear manner.</li> <li>• They are relevant to the research question, and the variables and their relationships are stated but are based on some flawed logic.</li> <li>• They are tied to theories to some extent, and the predictions of the hypotheses are somewhat reasonable.</li> </ul>	<ul style="list-style-type: none"> <li>• The proposed hypotheses are not testable and falsifiable.</li> <li>• They are not relevant to the research question, and the variables and their relationships are not stated or are stated but not logically sound.</li> <li>• They are irrelevant to theories, and the predictions of the hypotheses are not reasonable.</li> </ul>

Variable Design	<ul style="list-style-type: none"> <li>• Independent and dependent variables are correctly identified.</li> <li>• Variables are meaningful, realistic, operational, and well-observable, with states accurately specified. Variables are adequate for complete analysis.</li> <li>• The relationships between the variables are fully discussed.</li> </ul>	<ul style="list-style-type: none"> <li>• Independent and dependent variables are correctly identified.</li> <li>• Some variables may be impractical, ambiguously stated, or inadequate for complete analysis.</li> <li>• The relationships between the variables are discussed.</li> </ul>	<ul style="list-style-type: none"> <li>• Variables are identified, but few of them are misclassified.</li> <li>• Most of the variables are impractical, ambiguously stated or inadequate for complete analysis.</li> <li>• The relationships between the variables are discussed.</li> </ul>	<ul style="list-style-type: none"> <li>• Variables are not identified.</li> <li>• The relationships between the variables are not discussed.</li> </ul>
Experimental Design	<ul style="list-style-type: none"> <li>• Representative participants of an appropriate size are recruited, given systematic instruction during the experiment.</li> <li>• All materials and equipment used in the experiment are clearly described with complete justification.</li> <li>• Well-constructed experiment procedures are listed in clear steps and detailed enough to be duplicated by another.</li> <li>• Possible confounding variables are addressed as many as possible, and solutions like randomization are used.</li> <li>• Data collection is systematic and logically controlled, providing adequate and reliable data for the analysis.</li> </ul>	<ul style="list-style-type: none"> <li>• Representative participants of an appropriate size are recruited, but they may not receive systematic instructions during the experiment.</li> <li>• Almost all materials and equipment used in the experiment are clearly described with incomplete justification.</li> <li>• Experiment procedures are listed in logical steps without enough detail to follow.</li> <li>• Possible confounding variables are addressed, and solutions like randomization are partially used.</li> <li>• Data collection is systematic and logically controlled.</li> </ul>	<ul style="list-style-type: none"> <li>• Representative participants are recruited but they may not receive systematic instructions during the experiment. Participants' numbers are not powerful enough to detect most effects.</li> <li>• Many materials and equipment used in the experiment are described with incomplete justification.</li> <li>• Experiment procedures are listed but not in a logical order, and details are omitted.</li> <li>• Possible confounding variables are addressed without further solutions.</li> <li>• Data collection may not be systematic and logically controlled.</li> </ul>	<ul style="list-style-type: none"> <li>• Participants are non-representative or given systematic instructions during the experiment. Participants' numbers are not powerful enough to detect effects.</li> <li>• Many materials and equipment are described inaccurately or not described at all.</li> <li>• Experiment procedures are confusing and not in a logical order.</li> <li>• Possible confounding variables are not addressed at all.</li> <li>• Data collection may not be systematic and not clearly decided on how to measure the variables.</li> </ul>
Data Quality	<ul style="list-style-type: none"> <li>• With a clear definition and explanation, data is complete with</li> </ul>	<ul style="list-style-type: none"> <li>• With clear definition and explanation, data is complete</li> </ul>	<ul style="list-style-type: none"> <li>• Data is defined and explained. Key information</li> </ul>	<ul style="list-style-type: none"> <li>• Data is not clearly explained, not</li> </ul>

and Analysis	<p>professionally-looking presentations.</p> <ul style="list-style-type: none"> <li>• Able to leverage appropriate statistical methods to examine the data. Clear statistical results are presented and analyzed along with the confidence of the findings.</li> <li>• A clear understanding of the characteristics and limitations of the data is demonstrated.</li> <li>• Alternative interpretations of the data are provided.</li> </ul>	<p>with easy-to-follow presentations.</p> <ul style="list-style-type: none"> <li>• Able to leverage appropriate statistical methods to analyze the data with results nicely presented.</li> <li>• Justification is provided in selecting the analytical approach.</li> <li>• Able to draw meaningful conclusions based on the analysis.</li> </ul>	<p>and relevant data are provided.</p> <ul style="list-style-type: none"> <li>• Only rudimentary interpretation and analysis are conducted or the analytical methodology is flawed.</li> <li>• Unable to explain the result from the data analysis or the interpretation is not correct.</li> </ul>	<p>accurate, or not relevant to the research question.</p> <ul style="list-style-type: none"> <li>• Certain important information is missing or being left out.</li> <li>• Data presentations are hard to follow.</li> <li>• No analysis is conducted for the data.</li> </ul>
Quality of Conclusion	<ul style="list-style-type: none"> <li>• A convincing conclusion is presented to address the research question, with a high degree of articulation.</li> <li>• The contributions and limitations of the findings are analyzed.</li> <li>• Findings demonstrate significant implications with a high degree of external validity, theoretically, practically, or creatively.</li> </ul>	<ul style="list-style-type: none"> <li>• A meaningful conclusion is presented in addressing the research question.</li> <li>• The contributions and significance of the findings are clearly explained.</li> <li>• Limitations of the research are discussed along with interesting future research directions proposed.</li> </ul>	<ul style="list-style-type: none"> <li>• A conclusion is presented to address the research question.</li> <li>• The contributions and significance of the findings are unclear.</li> <li>• No discussion of its limitations or future research direction is included.</li> </ul>	<ul style="list-style-type: none"> <li>• The conclusion presented is either not relevant to the research question or not convincing.</li> </ul>