

Evaluating Experiments



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Introduction

In reviewing an experiment research paper the following components must be examined

- Research Problem Investigation
- Research Design
- Research Execution
- Results

These can be validated using Wieringa's Unified Checklist



Research Problem

- ① Engineering cycle is present (i.e. problem statement and related work)
- ② Knowledge goals are present (i.e. research objectives stated)
- ③ Conceptual model is described including the variables, parameters, subjects and objects of the experiment.
- ④ Conceptual model validity including the defined standardized measures.
- ⑤ Unit of study
- ⑥ Research questions are present including the specification of research goals, and hypotheses
- ⑦ Current knowledge is present as part of the related work or background.



Research Design

- ⑧ Unit of data collection acquisition strategy (i.e. sampling strategy) has been defined. The structure of the unit of data collection has been described (i.e. sample size, subject characteristics, the objects, groupings, experimental design, and context).
- ⑨ Treatment of the unit of data collection is specified and the method of treatment assignment is specified (i.e. the experimental design and preparation are specified).
- ⑩ Methods of measurement including the data collection procedures and measurement instruments have been specified.
- ⑪ The kind of reasoning (statistical, case-based) and the analysis procedure have been specified.

Research Design Validation

- 12 The external validity and ethical concerns for the unit of data collection have been addressed.
- 13 The instrument validity, external validity, and ethics of the treatment have been addressed.
- 14 The measurement validity and instrument validity of the measurement procedures has been addressed.
- 15 The conclusion and internal validity of the reasoning have been addressed.



Research Execution

- 16 The results of unit of data collection acquisition are provided.
- 17 The execution of the treatment including the preparation and data collection performed are described.
- 18 The results of the execution of the measurements are provided.



Results Evaluation

- 19 The data is provided and any data set reduction noted.
- 20 The observations (via descriptive statistics) are provided.
- 21 The results are explained via an evaluation of the results and their implications.
- 22 Answers to the research questions are provided along with any hypothesis testing.



Results Evaluation

- 23 Generalizations are made through statistical or analytical inference to a more general conclusion.
- 24 Limitations of the study are discussed (specifically in the context of the statistical tests used).
- 25 Contribution to knowledge goals via relation to existing evidence is discussed.
- 26 Contribution to engineering goals via the impact of the results is discussed.



Are there any questions?