

# Guideline for Reading CHI papers Critically

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## 1 Proceeding Paper vs. Late-Breaking Work

While the guideline is generally suitable for users to read both the CHI proceeding paper and late-breaking work critically, users may want to set different expectations on these two types of papers. CHI proceeding papers are archival publications of original research in the field of Human-Computer Interaction (HCI), while the Late-Breaking Works (LBWs) track provides the CHI community with an opportunity to present new and exciting contributions that showcase innovative technologies, extend prior research conversations, detail short self-contained studies, or provide provocations for new work and ideas to emerge. In a word, proceeding paper requires more rigorous and more complete work than late-breaking work.

## 2 General Guideline for Critical Paper Reading

When we read critically, we use our critical thinking skills to question both the text and our own reading of it. In general, you can follow the following steps recommended by experienced researchers to exercise and learn how to read scientific papers critically. The guideline provides example questions that a critical reader could ask in each step. Note that you do not always need to follow it step by step.

### 2.1 Step 1: Set a reading goal.

Think about why you have selected the paper and how your critical analysis of it may contribute to your inquiry. This will provide you with a constructive purpose for reading it critically.

*Example critical thinking questions:* Why am I reading this paper? Why select this paper? Does the critical analysis of this paper fit into my research focus?

### 2.2 Step 2: Understand the general idea.

Try to understand the general idea of the paper by going over the abstract and introduction. If you are assessing the value of authors' findings or ideas for your own interests, you need to understand the purpose of this paper clearly.

*Example critical thinking questions:* What is the overall theme? What is the key idea of the paper? Who is it in dialogue with?

### 2.3 Step 3: Dig into each part that is of your interest.

When you want to have a deep understanding of one part of the paper, you may need to think critically from four levels:

#### 2.3.1 Main purpose and/or main concept of this part (what)

Try to be engaged in analyzing the claims the author is making. For example, what this part reports, what was discovered, and what is the conclusion of this part. The purpose of each paragraph is usually claimed in its first sentence.

*Example critical thinking questions:* What is being argued? What is the main claim? What are the key concepts?

### 2.3.2 How authors achieve this purpose (how)

Try to extract the logic that leads to the claims of this part, such as the methods that the authors use.

*Example critical thinking questions:* What range of sources is used to back up the claims? What are the supporting points/examples? What methodology is employed?

### 2.3.3 Why the authors do it in this way (why)

Try to identify authors' rationales for their logic and claims.

*Example critical thinking questions:* With what degree of certainty do the authors make their claims? What are the authors' justifications for choosing this method? Why do authors use this dataset?

### 2.3.4 How well it is and/or how it helps (how well)

Try to evaluate the quality of the authors' arguments, particularly about the strength, weaknesses, and relevance of the supporting points for claims that are made.

*Example critical thinking questions:* How consistent are the authors' claims with each other? Are the assumptions that the authors make reasonable? How can the readers make use of these claims?

Note that it is not necessary to go over a part of the paper from all these four levels. Yet, it is a good practice recommended by many experienced researchers to have critical thinking from these four levels when applicable.

## 2.4 Step 4: Reflect on the paper

At the end of reading a paper, you'd better have a reflection on it. For the purpose of fulfilling your reading goal of this paper, you should think about how it can contribute to your future work, e.g., its method, its findings, its discussion.

*Example critical thinking questions:* What is the value of this paper? What are the strengths and weaknesses of the paper? How does it contribute to the research community?

### 3 Critical Question to Be Asked in CHI Papers

For your reference, the following critical thinking questions are collected from experienced HCI researchers and are categorized based on their themes. **In each theme, when applicable, the questions are further summarized into different aspects and four levels in Step 3, i.e., what – how – why – how well.**

#### 3.1 Abstract

- **Background/Motivation:**
  - **(What)** What is the general background of this paper? What is the research problem in this paper? What is the key idea? What is the problem that the authors want to solve?
  - **(Why)** Why is this problem important?
- **Target:**
  - **(What)** Who is it in dialogue with? Who are the targeted audiences?
- **Proposed work:**
  - **(What)** What does this paper mainly do? What type of paper is it, e.g., system paper, understanding paper, survey paper, etc.? What is the sample size of the experiment if the paper has one?
  - **(How)** What kind of approaches do they use? What methods are used in this work? How did the authors solve the problems? Does the paper involve an experiment or user study? If yes, what type of experiment?
- **Findings:**
  - **(What)** What are the main findings of the paper? What is the conclusion of the paper? What is new in this paper?
- **Relevance:**
  - **(How well)** Is the topic of the paper relevant to what I am looking for or not? Is this problem useful for the needs of your own research purpose? Does this paper related to your research interests?

#### 3.2 Introduction

Titles of section/subsection could include "Introduction", "Introduction and motivation", "Challenges", "Introduction and Background" and "Motivation".

- **Background/Problem:**
  - **(What)** What is the background of the research presented in the first paragraph? What is the background of the problem? What is the background of the research?
- **Motivation:**
  - **(What)** What is the motivation for the work? What is the purpose of this paper? What is the authors' motivation to carry out such research?
  - **(Why)** Why should we care about this research problem?

- **(How well)** Is the motivation of this research clear and strong? Is the research problem important? How important is the problem or question that this submission addresses?
- **Proposed work:**
  - **(What)** What is the key idea of the paper? What is the pipeline of this research? What is the structure of the story in this paper? What new ideas or approaches are introduced?
  - **(How)** Is the proposed work/design/system build from scratch or extended from others' work?
  - **(How well)** Is the method of this work novel?
- **Findings:**
  - **(What)** What are the main findings of this research? What are the main things that the paper is going to present?
  - **(How well)** What is the benefit of the findings?
- **Contribution:**
  - **(What)** What are the claimed contributions? What are the specific contributions of this paper? What is their contribution? What is the claimed contribution of this paper? What is the intended contribution of the paper?
  - **(How)** How does the work build on or speak to existing work in the area?
  - **(Why)** Why do the contribution and benefit matter?
  - **(How well)** How can these contributions help you? Is there an audience at CHI that would find this work influential and/or compelling? Does it make a novel contribution? How important / novel is the intended contribution of the paper? How likely is it that the output of this work will contribute to the identified problem or question? How greatly can others benefit from this work? How novel is the contribution?

### 3.3 Related Work

Titles of section/subsection could include "Related Work", "Background", "Introduction and Background" and "Background and Related Work".

- **Logic/Structure:**
  - **(What)** What is the logic between each subsection of the related work? Do the authors categorize the existing methods and previous works? What categories of related works are presented? What kinds of related work should you know before understanding this paper? What are the authors' comments on the previous works?
  - **(How)** How is each related work built upon the previous one?
  - **(How well)** Do the authors only list the related works without a clear logic?
- **Previous work:**

- **(What)** What the related work did and why they did so? For example, this work did this because... It is interesting because .. What are the existing methods that could address a similar problem in this paper? What was the obstacle that people couldn't address this problem before? Maybe it is not necessary for their contexts? Maybe the technology is not advanced enough?
- **(Why)** Why are people doing this research?
- **(How well)** Are the authors' comments reasonable? Do the authors' comments on previous works make sense? Do the related works come from reliable sources? Is prior work adequately reviewed?
- **Need for this work:**
  - **(What)** What was the need to do this research at this time? What are the differences between this work and previous ones? What is the position of this work in the literature?
  - **(How)** How is this problem situated in the literature? How do the authors situate and put their paper in the context of the literature?
  - **(How well)** How well does the paper communicate the work and contribution to its audience (including situating the work in the context of the research literature)? How clearly does the submission describe how it differs from and goes beyond the most relevant previous work in this area?

### 3.4 Method

Titles of section/subsection could include "Method", "Methodology", "Approach" and "METHODOLOGY".

- **Purpose:**
  - **(What)** What is the authors' purpose for adopting such methods?
  - **(How well)** Does the paper clearly explain what the purpose of each method is?
- **Facts:**
  - **(What)** What research methods are referred to in this paper? What is the scenario/method? Is there any requirement for using these methods? Do the authors have an overview of their methods?
  - **(How)** How do the authors adapt the methods in their context? How do the authors use the methods step by step? How do the proposed methods achieve the purpose step by step?
  - **(How well)** Are these methods standard or classic? How appropriate are the chosen methods for the work being undertaken? Do any claims in the methods seem too certain? Do the authors clarify enough details for you to understand their methods? Whether the descriptions of the methods are clearly presented? Whether the methods are replicable or not?
- **Justification:**

- **(What)** What are the rationales for choosing these methods as there could be other methods? Why do the authors select these scenarios/methods? Do the authors justify the choices of these methods? Why did the authors choose this method?
- **(How well)** Whether the justification for methods is properly presented in this paper? How well are the chosen methods described and justified within the submission?
- **Novelty/Strength:**
  - **(How well)** If a new approach/technique/method was introduced in a paper, what are the key elements of the newly proposed approach? What is the advantage of their method? What is the advantage over conventional methods?

### 3.5 Data

Titles of section/subsection could include "Data", "Data set" and "Data collection".

- **Collection:**
  - **(What)** Which source is the data from? If it is sampled, what techniques the authors used for sampling?
  - **(How)** How is this data set gathered? Is the data collected by the authors or others? Is the data sampled from a possible larger data set?
  - **(Why)** Why did the authors choose the data set? Do the authors justify why they collect the data in this way?
  - **(How well)** If it is public, is the source reliable? Are the sources of the data set reliable? Do they have the right data for the following analyses? If the data needs labeling, are these labels reliable?
- **Characteristics:**
  - **(What)** What is the type of data set, e.g., qualitative or quantitative? How much data do they have? What kinds of features/characteristics does the data have? What kinds of data features are the authors going to utilize?
  - **(How)** If it is quantitative, what is the average in the data description? If it is qualitative, what is the participants' expertise?
- **Usage:**
  - **(What)** What is the purpose of creating/using this data set?
  - **(How)** How is this data set used in the research?
  - **(Why)** Why do the authors use this data set?
  - **(How well)** What other scenarios can use this type of data? Is the data set representative to address the research problem? Whether the data fit the research problem?
- **Replicability/Availability:**
  - **(What)** Is it publicly available?
  - **(How well)** Do they describe the data clearly? Is the dataset replicable so that the readers can use it for their own purpose? Is the description of the data detailed enough for readers to reproduce this work? If it is

collected by the authors, can the readers reproduce it using similar methods?

- **Ethical concern:**
  - **(How well)** Are ethical concerns satisfied when the authors collected the data? Did the authors follow some practices to protect the privacy of the people in the data?

### 3.6 System / Design

Titles of section/subsection could include "Apparatus", "Implementation", "Design", "Setup", "System Overview", "Hardware", "Design Space", "Software", "System Design", "Prototype", "Design Rationale", "Equipment", "Design Goals", "Interface" and "System Design and Implementation".

- **Requirement/Criteria:**
  - **(What)** What are the design requirements? What is the philosophy behind this design? What criteria are included when people are designing this system?
  - **(How)** How do the authors derive the design requirements?
  - **(How well)** Does the design satisfy the design requirements, if any?
- **Idea/Function:**
  - **(What)** What is the function of each part of the design? What is the core idea of this system or design?
  - **(How well)** What is the unique part of the system or design?
- **Design choice:**
  - **(What)** What design choices are made by authors in developing the system? Are there alternative designs?
  - **(How)** How are the design choices made?
  - **(Why)** Why are other design alternatives not appropriate in this context? How have people come up with this design? How do the authors argue for their design choices? Do the authors justify their design choices?
  - **(How well)** Do you think the design is reasonable? Are all decisions the authors made supported by some references? What if the paper referred has also done wrong? Are you convinced by the arguments for the design choices presented? Are there specific weaknesses that would undermine confidence in the paper's claims or results? Do you think the design is great?
- **Reproducibility:**
  - **(How well)** Can we reproduce the system or design?

### 3.7 Research Question / Hypotheses

Titles of section/subsection could include "Hypotheses", "Research Questions" and "Research Questions and Hypotheses".



- **Variables:**
  - **(What)** What are the independent variables and dependent variables?
  - **(How well)** Are the independent variables and dependent variables reasonable?
- **RQs/Hypos:**
  - **(What)** What do the authors want to achieve with these research questions or hypotheses? What is the need for the hypotheses?
  - **(How)** How do the authors come up with the research questions or hypotheses? Do they have any references to come up with the hypotheses? Are there any backups for coming up with these research questions or hypotheses? Do the authors give some hints in the introduction that lead to the research questions or hypotheses?
  - **(Why)** Do the authors have clear justifications on their hypotheses or research questions?
  - **(How well)** Can these research questions answer what the authors want to evaluate? Are they consistent with your own experience? Do the research questions or hypotheses make sense? Are the research questions matched with the authors' motivation? Whether the research questions have strong connections to motivation? Are these research questions or hypotheses matched the authors' proposed works in the introduction?
- **Clarity:**
  - **(How well)** Are the research questions or hypotheses short and concise? Could it be better written?

### 3.8 Experiment / Study

Titles of section/subsection could include "Study Design", "User Study", "Experimental Design", "Experiment", "Study", "Study Setup", "Study 1", "Study Method", "Field Study" and "Study Protocol".

- **Pilot study:**
  - **(What)** Do the authors have a pilot study? If yes, what do they learn from the pilot study?
- **Main study goal:**
  - **(What)** What is the purpose of the experiment? What is the goal of this experiment? What is the authors' purpose in conducting this experiment?
  - **(Why)** Why do the authors design the experiments in this way?
  - **(How well)** Can the study achieve its purpose?
- **Design:**
  - **(What)** Who are the targeted participants? What is the sample size of participants? What type of experiment is it, such as the between-subject, within-subject, lab study, or field study? What type of experiment is it, e.g., lab study, field study, comparison, etc.? Is it a between-subject or within-subject study?

- **(How)** Do they have a reasonable baseline in the study? Whether the experiment follows the rules of experiment design?
- **(Why)** Why do the authors choose this type of experiment?
- **(How well)** Whether the experiment is designed appropriately to check their research questions? Is there any smart/impressive design in the experiment?
- **Validity:**
  - **(How well)** How appropriate are the design and process of the experiment? Are there specific weaknesses that would undermine confidence in the paper's claims or results? Is the experiment fair for each condition and each participant?
- **Clarity/Replicability:**
  - **(How well)** Is the study replicable? Do the authors present the experiment clearly?

### 3.9 Participant

Titles of section/subsection could include "Participants", "Participants and Apparatus", "Recruitment", "Participants and Procedure" and "Participant Recruitment".

- **Sample size:**
  - **(What)** How many participants the experiment has?
  - **(How well)** Are the sample size of the users enough for the study? Are the number of participants sufficient enough for the study? Whether the sample size of the participants is enough?
- **Background/Demographics:**
  - **(What)** What is the background of the participants? What are the distributions of age and gender of the participants? What is the diversity among the participants, e.g., in terms of gender and age?
  - **(How)** Do the authors diversify the participants? Do the authors balance the gender and age of the participants?
  - **(How well)** Does any background of the participants may affect the results significantly? What should other background information of the participants be considered in this study?
- **Recruitment:**
  - **(How)** Do the authors have a pre-screening section to recruit the participants? Does the study require that the participants have some domain knowledge? Do the authors have any control over the participants, and are the controls necessary?
  - **(How well)** Do the participants represent all of the people that this paper wants to research?
- **Validity:**
  - **(How well)** Are they targeting the proper participants to explore their research questions? Are the participants representative as targeted users? Do the authors consider any bias, such as racism?

### 3.10 Task

Titles of section/subsection could include "Task", "Materials", "Research Context", "Task and Procedure", "Conditions" and "Task Support and Interruptions".

- **Purpose:**
  - **(What)** What is the purpose of the task assigned to the participants? What is the purpose of carrying out this task?
  - **(How)** How do the authors decide on this task?
  - **(Why)** Why choose this task?
  - **(How well)** Is the task appropriate to answer the research questions or hypotheses?
- **Design:**
  - **(What)** Is this task an artificial task or a need-based task?
  - **(How)** Do the authors control some variables in the task? How long would the task take for each participant or each group? How long do the participants need to conduct this work, like a one-time event or continuously several days?
  - **(How well)** Is this task well-designed? Are there any flaws in this task design? Is the task reasonable, e.g., in terms of learning effect, workload, etc.? Is the task natural as the users can do it in their daily life? Is the task appropriately situated in a real-world context? Were the tasks used in other papers in similar contexts?
- **Clarity/Replicability:**
  - **(How well)** Do the authors clearly explain the task? Is the description of the task detailed enough for replication? Can you think of the task scenario based on the description or image of the task, if any?

### 3.11 Procedure

Titles of section/subsection could include "Procedure", "Interviews", "Task and Procedure", "Participants & Procedure", "Study Procedure" and "Design Process".

- **Details:**
  - **(What)** What is the pipeline of the procedure? How many steps should the participant complete?
  - **(How)** Do they have consent from the participants? How long does the procedure take for each participant? How long does the procedure last?
  - **(Why)** Why are the authors running the procedure in this way? Do the authors provide justifications for any decision made in the procedure?
  - **(How well)** Do the authors provide justifications for any decision made in the procedure? Do the authors propose something new in the procedure? If yes, do they have strong justification or references?
- **Payment:**
  - **(What)** How much the participant gets paid?
  - **(How well)** Do the participants get reasonable payment for their time?

- **Clarity:**
  - **(How well)** Is the procedure clear for you? Does the procedure include any necessary detail?

### 3.12 Measures

Titles of section/subsection could include "Measures", "Measurements", "Questionnaires", "Observations", "User Evaluation" and "Survey".

- **Purpose:**
  - **(What)** What is the purpose of each measurement?
  - **(Why)** Why have these measures been chosen specifically for this research?
- **Details:**
  - **(What)** What are the measures?
  - **(How)** Does the paper have a reference for each measurement?
  - **(How well)** What is the precision of the measures, like how accurate they can capture the intended things that the authors want to evaluate? Are these measurements able to answer the research questions? Whether these measurements are appropriate to investigate the research questions? Whether the measures can reflect the variables properly? Are you convinced that the measurements can achieve their purposes properly? If not, why?
- **Validity:**
  - **(How)** Do the authors have any references to back up the measurements? Are these measures previously used in literature or not?
  - **(How well)** If the paper has subjective measurements, are they standard? If the paper has biological measures, are they reasonable? For example, how many times have they measured it? Are the measurements from reliable sources? Will any factor affect the quality of the measurements, such as the system error?

### 3.13 Analysis

Titles of section/subsection could include "Data Analysis", "Analysis and Results", "Analysis", "Qualitative Analysis", "Data and Analysis", "Quantitative Analysis" and "Data Processing".

- **Method:**
  - **(What)** What methods are used for the data analysis, e.g., quantitative or qualitative analysis? What type of methods are used to analyze the data, e.g., statistic, qualitative, etc.? What tools are they using for the analysis?
  - **(How)** If it is a quantitative analysis, is it a systematic practice? If they do statistical analysis, how do they interpret the p-value, like is it

adjusted? If it is a qualitative analysis, how are people gathered to conduct the coding, discuss issues, and make the final decision? Whether the tools match with the study or not?

- **(How well)** Are the analysis methods, e.g., qualitative or quantitative analysis, suitable in this case? Do they use the right method to analyze the data? If not, what could be the alternative method?
- **Clarity/Reproducibility:**
  - **(How well)** Are the descriptions of the analyses complete? Is the description of data analysis clear enough for you? If not, what details should be added? Is the description detailed enough for you to reproduce it?
- **Privacy concern:**
  - **(How)** Whether the authors did data masking to protect the users' privacy?

### 3.14 Results

Titles of section/subsection could include "Results", "Findings & Discussions", "Analysis and Results", "Preliminary Findings", "Findings", "Qualitative Feedback", "User Feedback " and "Summary of Findings".

- **Findings:**
  - **(What)** What are the main findings of this research? What are the results of the research questions or hypotheses, if any? What are the main findings reported in this part? What type of results are presented, like qualitative or quantitative results?
  - **(How well)** How well are the submission's claims and conclusions supported by the results? Are these findings surprising? How confidently can researchers and practitioners use the results?
- **Structure/Logic:**
  - **(How well)** Are the results presented correctly? Do the authors present the results completely, e.g., from both the good side and the bad side? Whether the subsections of results are closely connected to the research questions? If it is qualitative, are the results well-organized with users' own thinking? If it is quantitative, are the results presented in a standard way?
- **Interpretation:**
  - **(What)** Do they have a little bit of discussion on the results here? Do they interpret the results? Do the authors have qualitative interpretations of their results?
  - **(How well)** Is the interpretation of the results reasonable? Are you convinced by the interpretations presented?

### 3.15 Discussion

Titles of section/subsection could include "Discussion", "Discussion & Conclusion", "Results & Discussion", "Findings & Discussions", "Discussion and Implications" and "Discussion and Limitations".

- **Explanation of findings:**
  - **(What)** What is the message the authors wish to deliver to the research communities? What are the main claims that are discussed? Do the authors provide some explanations/illustrations about their findings? Is there something new in the discussion? Are there any other findings beyond the authors' expectations?
  - **(How)** How could we have a deeper understanding of the findings from this part?
  - **(How well)** Can the results be generalized or adapted to other domains/contexts? Do the authors just repeat their results in the discussions? Is there any interesting point in this section? Do the authors point out any potential problem of their research or findings? What could be the challenges to use their findings?
- **Link to other works:**
  - **(What)** What are the links between the findings and some existing theories/results? What are the connections between this research and other works?
- **Implications:**
  - **(What)** Do the discussion here answer the "so what" question, like this research is done, so what? What are the implications for the research community? What are the implications for practitioners? Do they have any insights for future works?
  - **(How)** Which directions should other researchers to extend this work?
  - **(How well)** Are the findings insightful and meaningful for us? Do you feel the discussion is insightful?

### 3.16 Implication

Titles of section/subsection could include "Design Implications", "Design Recommendations", "Implications", "Implications for Design", "Implications for Design" and "Design Considerations".

- **Logic:**
  - **(What)** Who are the audiences? Are these implications practical or theoretical?
  - **(How)** What are the references that support the value of this research? Do they have proper examples to help us understand the insights? Do they provide specific examples of the implications or design considerations? How do the authors come up with these implications, e.g., from their findings, previous works, etc.? Do the implications have any backup, e.g., by findings or related work?

- **Usefulness:**
  - **(How)** How is this research going to help?
  - **(How well)** Do the implications have some impacts on someone out there? How can this research be generalized? How can you or other researchers make use of these implications?
- **Depth/Insightfulness:**
  - **(How well)** Whether the implications are truly useful? Is the insight meaningful? Do the implications match your own experience? Are the insights here exciting for you? Do you feel that the implications are novel or have been discussed in other works? Would the insights be too common? Are these implications really insightful? Is there any insight for people who do not prefer the proposed design/system, if any?

### 3.17 Limitation / Future Work

Titles of section/subsection could include "Limitations", "Limitations and Future Work", "Future Work" and "Limitations and Future Directions".

- **Seriousness of limitation:**
  - **(How well)** Would the limitations largely impact the quality of the results? Are these limitations serious? Whether that kind of limitation is avoidable or inevitable in this study? Do these limitations harm the results to an unacceptable extent? Was the limitation intentional or unintentional? Are you convinced by the reasons that authors do not address these limitations in this work?
- **Completeness/Integrity:**
  - **(How well)** Do the authors honestly discuss their limitations? Do the authors only mention the trivial limitations but ignore the serious ones? Are the authors honest in presenting the limitations? Are there other limitations that the authors did not mention? Whether some other parts of this research are not feasible or not complete? Think of that you are going to replicate this work, what kinds of new limitations may you encounter?
- **Future work:**
  - **(What)** Do they give some hints/clues/suggestions about how they plan to address these limitations?
  - **(How)** How to avoid such limitations in future work? How could future work address these limitations?
  - **(How well)** Is the future work pointed out here insightful? How can we follow this work by addressing its limitations? Can we extend this research from the limitations?

### 3.18 Conclusion

Titles of section/subsection could include "Conclusion", "Discussion & Conclusion" and "Future Work and Conclusion".

- **Logic:**
  - **(What)** What is the basic idea of the research problem?
  - **(How well)** Is the conclusion consistent with the introduction?
- **Usefulness:**
  - **(How well)** What are the strengths and weaknesses of the paper? What is the take-home message of this work? How is this work useful? Is it useful for your work? What message can I learn from this paper? What is the main contribution of this work?

### 3.19 Reference

- **Characteristics:**
  - **(What)** Whether the cited papers are the recent ones? Are these references mainly from high-quality sources? What is the main venue for these references? Whether this paper cites a lot of works in the same venue?
  - **(How well)** Whether the paper cites sufficient works in the same community? Whether it cites a paper you read before?