

Question-Hint Pairs for Reading CHI papers Critically

Table of Contents

1 Critical Thinking Question to Be Asked in CHI Papers.....	2
1.1 Abstract.....	2
1.2 Introduction	2
1.3 Related Work.....	3
1.4 Method.....	4
1.5 Data.....	4
1.6 System / Design	5
1.7 Research questions / Hypotheses.....	5
1.8 Experiment / Study	6
1.9 Participant.....	7
1.10 Ethics	8
1.11 Procedure.....	8
1.12 Measures.....	9
1.13 Analysis	9
1.14 Results	10
1.15 Discussion.....	10
1.16 Implication.....	11
1.17 Limitation & Future Work.....	11
1.18 Conclusion.....	12
1.19 Reference	12

1 Critical Thinking Question to Be Asked in CHI Papers

For your reference, the following critical thinking questions and associated hints 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 “Comprehension - Description”, “Criticism - Analysis”, and “Criticism - Evaluation”.**

1.1 Abstract

- **Description**
 - **(Question)** What is the general motivation of the paper?
 - **(Hint)** You can check the first couple of sentences.
 - **(Question)** What are the contributions the authors propose?
 - **(Hint)** First occurrence of "this work", "this paper", "we", etc.
 - **(Question)** What are the main findings of the paper?
 - **(Hint)** Usually it is in the last couple of sentences.
- **Analysis:**
 - **(Question)** How is the problem authors addressed differently from the previous work?
 - **(Hint)** Related information is generally after the brief intro of the general background, may have keywords like "Different from", "unlike", "gap", etc.
 - **(Question)** How do the authors conduct their work?
 - **(Hint)** In the middle of the abstract, e.g. in this work, "we", "present", "propose", "introduce", etc.
- **Evaluation:**
 - **(Question)** Why is this problem important?
 - **(Hint)** The benefit to the targeted users? It may contain words like "impact" and "challenge".
 - **(Question)** How can these contributions help you?
 - **(Hint)** Think about their possible implications and applications.

1.2 Introduction

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

- **Description**
 - **(Question)** What is the purpose of this paper?
 - **(Hint)** The paper's purpose usually contains keywords like "aim", "propose", "this paper", "this work", "we", etc. (first occurrence) in the first or last sentence of the paragraph.
 - **(Question)** What is the potential audience of this research work?
 - **(Hint)** The answer usually contains "researchers" in a certain area, "XXX (research) community" in general background or contribution part.

- **Analysis:**
 - **(Question)** What are the alternative ways to achieve the purpose?
 - **(Hint)** Usually mentioned in the second or third paragraph, keywords like "literature", "existing/previous/prior/current work/research/studies".
 - **(Question)** Why did authors use this type of experiment method to test their proposed solutions?
 - **(Hint)** It could be "to ..." before or after presenting the method.
- **Evaluation:**
 - **(Question)** Is the method of this work novel?
 - **(Hint)** Is it clear about the difference compared to previous works? Check how the authors claim it as "novel", "new", "the first", "different from", etc.
 - **(Question)** How can these contributions help you?
 - **(Hint)** For example, as a reference for your research, as a choice of your methods? At the end of the contribution statements, the paper may mention the implication to others.

1.3 Related Work

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

- **Description**
 - **(Question)** What categories of related works are presented?
 - **(Hint)** The title of each subsection.
- **Analysis:**
 - **(Question)** How do the authors link their work to the previous research?
 - **(Hint)** They are usually mentioned in the last paragraph of each subsection or right after the appearance of the previous work, with keywords like "we", "this work", "this paper".
 - **(Question)** Are there any other ways to organize the related work sections?
 - **(Hint)** Check the logic and transitions between the subsections. Think about: this section is divided into two / three parts. First...
 - **(Question)** How does each subsection of the related work correlate to the motivation mentioned in the introduction?
 - **(Hint)** See if points (related work) mentioned in the intro are covered.
- **Evaluation:**
 - **(Question)** Are the authors' comments on previous work reasonable?
 - **(Hint)** E.g., are they too certain? Are they too mean or negative?
 - **(Question)** How well do the authors summarize the previous work?

- **(Hint)** Is there any missing part? Provide necessary details about the works presented?
- **(Question)** How clearly do you think this work differs from previous work?
 - **(Hint)** E.g., can you easily understand the difference? Can you see the explicit contrast drawn by the authors?

1.4 Method

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

- **Description**
 - **(Question)** What is the main method used here?
 - **(Hint)** See the claims of research/study methods.
 - **(Question)** How do the authors apply the method in their specific context?
 - **(Hint)** Check indicators of the sequence of events/pipelines/work flows.
- **Analysis:**
 - **(Question)** Why do the authors choose to use this method?
 - **(Hint)** E.g., any specific benefit in this context? Any reference? Keywords like "Because", "since", "as", "due to", etc.
- **Evaluation:**
 - **(Question)** Could these methods be generalized in other contexts?
 - **(Hint)** See if this method is new or well cited. If the former, see if any discussion about generalization.
 - **(Question)** Are their methods effective?
 - **(Hint)** For example, required resources and time (cost), what part is the bottleneck, or what parts can be run in parallel.

1.5 Data

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

- **Description**
 - **(Question)** What is the source of the data?
 - **(Hint)** See data collection methods, usually in the first few sentences of the section.
 - **(Question)** What is the purpose of the dataset?
 - **(Hint)** For example, building a model? Understanding some phenomenon? Usually in the first sentence.
- **Analysis:**
 - **(Question)** How is the data collected?
 - **(Hint)** Archived? Crawled? Captured?
 - **(Question)** Why is the data used in research is appropriate?
 - **(Hint)** Representativeness, reliability, etc.

- **Evaluation:**
 - **(Question)** Is the dataset replicable so that the readers can use it for their own purpose?
 - **(Hint)** Publicize/open-source the dataset?
 - **(Question)** Is the scale of the dataset appropriate?
 - **(Hint)** E.g., too large or too small for the purpose and research method of the paper?

1.6 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".

- **Description**
 - **(Question)** What are the design requirements?
 - **(Hint)** Keywords like "design principle", "design requirements", "user needs", "design goals", "needs", "expectations", etc.
- **Analysis:**
 - **(Question)** How do the authors argue for their design choices?
 - **(Hint)** Presentation of alternatives, references, justifications, etc. E.g., the strength of their choices, the weaknesses of the alternatives?
 - **(Question)** How do the authors derive the design requirements?
 - **(Hint)** Theoretically or empirically, e.g., from the preliminary study, related works?
- **Evaluation:**
 - **(Question)** Are you convinced by the arguments for the design choices presented?
 - **(Hint)** Presentation of alternatives, references, justifications, etc. Is there any weak logic here?
 - **(Question)** Can we reproduce the system or design?
 - **(Hint)** Are there enough details about the algorithm, design, implementations, setup, etc.? Any open-sourced materials.

1.7 Research questions / Hypotheses

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

- **Description**
 - **(Question)** What are the research questions in the paper?

- **(Hint)** See "research questions" in this section, or in the intro, at the end of the related work, or at the beginning of the method section.
 - **(Question)** What are the hypotheses here?
 - **(Hint)** Usually this information will be highlighted and listed, e.g., "Hypothesis 1".
- **Analysis:**
 - **(Question)** What are the alternative methods to answer these research questions?
 - **(Hint)** Different experiment designs, e.g., an interview study, a field study, a lab study (see methods used by other related literature cited).
 - **(Question)** How can such a hypothesis be tested?
 - **(Hint)** See if mentioned under each hypothesis. Cross-check with the analysis section.
- **Evaluation:**
 - **(Question)** Can these research questions answer what the authors want to evaluate?
 - **(Hint)** Compare the RQs to the gaps/goals identified in the intro.
 - **(Question)** Whether these research questions can fill the gap of the motivation?
 - **(Hint)** Compare the RQs to the gaps/goals identified in the intro.
 - **(Question)** How convincing are these hypotheses?
 - **(Hint)** For example, is there any reference to backup them? Do they make the context clear for the hypothesis?
 - **(Question)** Do the hypothesis proposed by the authors have strong connections with the motivation?
 - **(Hint)** Cross-check with the research questions and goals of the paper.

1.8 Experiment / Study

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

- **Description**
 - **(Question)** What is the goal of the user study?
 - **(Hint)** Usually in the first sentence or paragraph.
 - **(Question)** What are the experiment setups?
 - **(Hint)** Like the location, arrangement, equipment, etc.
- **Analysis:**
 - **(Question)** Why do the authors design the experiments in this way?

- **(Hint)** Explanation/justification after the method claim, e.g., can simulate the real-world scenario? Can control certain variables? To eliminate the learning effect?
 - **(Question)** Can the user study be designed in an alternative way? i.e., changing with-in subject study to between subjects.
 - **(Hint)** For example, a different location, arrangement, equipment, medium, etc.
- **Evaluation:**
 - **(Question)** How appropriate are the design and process of the experiment?
 - **(Hint)** Any specific points that you feel are unconvincing? Control for internal/external/ecological validity?
 - **(Question)** What can be possible weaknesses in the current experiment design?
 - **(Hint)** Possible issues about internal/external/ecological validity, like the personality of the users.

1.9 Participant

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

- **Description**
 - **(Question)** How many participants the experiment has?
 - **(Hint)** A number in this section.
 - **(Question)** What are the demographics of the users?
 - **(Hint)** E.g., age, gender, educational background, etc.
- **Analysis:**
 - **(Question)** Do the authors have a pre-screening session to recruit the participants?
 - **(Hint)** Are there inclusion and exclusion criteria? If yes, how? If no, would it affect the generalizability?
 - **(Question)** Why do authors recruit users with a certain background?
 - **(Hint)** Is there any justification for the choice of participants?
- **Evaluation:**
 - **(Question)** Are they targeting the proper participants to explore their research questions?
 - **(Hint)** Compare the target population to the participant profiles.
 - **(Question)** How much effort would we pay in participant recruitment to conduct a similar study?
 - **(Hint)** For example, some users with a particular background are extremely difficult to recruit, and some long-term studies are also very difficult. What is their recruitment channel?

1.10 Ethics

Titles of section/subsection could include “Ethical Considerations”.¹

- **Description**
 - **(Question)** What are the ethical actions that the authors take?
 - **(Hint)** Such as IRB, consent, (data) privacy protection, etc.
- **Analysis:**
 - **(Question)** What are the potential ethic risks in the experiments conducted by authors?
 - **(Hint)** Vulnerable population, privacy concerns, health/safety/social risks, etc.
- **Evaluation:**
 - **(Question)** Are there other possible ethic issues not mentioned by authors?
 - **(Hint)** Protection of vulnerable population, privacy concerns, health/safety/social risks, etc.

1.11 Procedure

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

- **Description**
 - **(Question)** What is the pipeline of the procedure?
 - **(Hint)** Find words (e.g., first, next, then, finally) indicating a sequence of events like "To do this, the author first...".
 - **(Question)** How much compensation do the participants get from the study?
 - **(Hint)** Mentions of compensation, payment, appreciation, etc.
- **Analysis:**
 - **(Question)** Do the authors provide justifications for any decision made in the procedure?
 - **(Hint)** Like why do they organize it in this way? Keywords like "Because", "since", "as", "due to", etc.
- **Evaluation:**
 - **(Question)** Does the procedure include any necessary detail?
 - **(Hint)** Think as if you want to reproduce it, check detailed numbers, activities, etc.
 - **(Question)** Do the compensations ensure the quality of the data they collected from the users?
 - **(Hint)** Is it fair for the amount of work done by the participants?

¹ Participants in the brainstorming workshop of Stage 2 suggest that they would like to treat the “Task” section category in Stage 1 as a part of 1.8 Experiment / Study. Also, they would like to add the 1.10 “Ethics” section category as it has become a more and more critical issue in CHI papers these days.

1.12 Measures

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

- **Description**
 - **(Question)** What are the measures?
 - **(Hint)** Usually presented as a list or subtitles of this section.
 - **(Question)** What is the meaning of each metric?
 - **(Hint)** See explanations and references for each.
- **Analysis:**
 - **(Question)** How do the authors apply these measures in their own context?
 - **(Hint)** Direct use of an existing instrument or with own adaptation (how)?
 - **(Question)** What would be the possible outcomes given from these measures?
 - **(Hint)** Data types, e.g., an outcome of yes or no, or a number, or a qualitative statement?
 - **(Question)** What are the relationships between metrics and research questions?
 - **(Hint)** E.g., what metrics answer which research question? Cross-check mentions in hypotheses, research models, etc.
- **Evaluation:**
 - **(Question)** How well do you think the measures are?
 - **(Hint)** For example, do they form a reliable source? Are they standard? Representative? Practical?
 - **(Question)** Are these measurements reasonable?
 - **(Hint)** For example, related to the context, can answer the RQ, have references for the definition?

1.13 Analysis

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

- **Description**
 - **(Question)** What type of methods is used to analyze the data?
 - **(Hint)** Quantitative, qualitative, or mixed, etc.
 - **(Question)** What are the data structures used by authors to store data?
 - **(Hint)** See data collection / measurement. See sample data, if any.
- **Analysis:**
 - **(Question)** What are the alternative ways to analyze the data?
 - **(Hint)** E.g., would there be a simpler way / test to analyze it?

- **Evaluation:**
 - **(Question)** Is the description detailed enough for you to reproduce the analysis process?
 - **(Hint)** Detailed entity names, numbers, activities, etc. Any possible missing detail?

1.14 Results

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

- **Description**
 - **(Question)** What are the main findings reported in this part?
 - **(Hint)** Check the subtitles of this section.
 - **(Question)** What are the formats of the results that the authors present?
 - **(Hint)** E.g., quantitative or qualitative, numbers, tables, figures, quotes, etc.
- **Analysis:**
 - **(Question)** Are there other ways to better present the results?
 - **(Hint)** E.g., using numbers, tables, figures, quotes, etc.
 - **(Question)** How do the authors interpret the numerical results statistically?
 - **(Hint)** E.g., any scientific terms like significance, effect size, confidence intervals, etc.
 - **(Question)** Are there some results not explained by the authors?
 - **(Hint)** With possible reasons, convincing explanations, etc. (citations, quotes, etc.)
- **Evaluation:**
 - **(Question)** Can the results answer the research questions?
 - **(Hint)** Compare the RQs with the results. See if there are direct mentions of RQs and hypotheses.
 - **(Question)** How convincing are the results?
 - **(Hint)** Choice of the test, soundness of explanations, etc. This argument is (not) entirely convincing, as...

1.15 Discussion

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

- **Description**
 - **(Question)** What are the main claims that are discussed?
 - **(Hint)** They would be summarized in subsection title and the first sentence, or the first paragraph of the discussion section.

- **Analysis:**
 - **(Question)** How could the potential audience benefit from this research?
 - **(Hint)** Do some parts (e.g., generalizability, possible applications, design considerations) of this section clearly state how a specific user group can use the methods, results, etc.?
- **Evaluation:**
 - **(Question)** Can the results be generalized or adapted to other domains / contexts?
 - **(Hint)** For example, do the authors mention the generalizability or limitation? Are you convinced by them?
 - **(Question)** Are these implications original and important?
 - **(Hint)** For example, are there references and comparisons to existing literature?
 - **(Question)** Are these implications related to the findings in this paper? Are they overclaimed?
 - **(Hint)** Try to refer to the results (e.g., sections, quotes, data, etc.) and see if they are consistent with the discussions.

1.16 Implication

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

- **Description**
 - **(Question)** What are the theoretical or practical implications?
 - **(Hint)** Usually in the subtitles of this section.
- **Analysis:**
 - **(Question)** Do the authors have proper examples to help us understand the insights?
 - **(Hint)** See "for example", "for instance", etc. If no, can you easily think of an example?
- **Evaluation:**
 - **(Question)** Are these implications truly useful?
 - **(Hint)** E.g., for their targeted audience, for yourself, how grounded and actionable are the implications?

1.17 Limitation & Future Work

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

- **Description**
 - **(Question)** What are the limitations mentioned by the authors?

- **(Hint)** Usually listed as "first", "second",
- **Analysis:**
 - **(Question)** Why are such limitations not addressed in this paper?
 - **(Hint)** E.g., difficult to conduct the experiment or lack of related work? Out of the paper's scope? May find explanations or justifications after the claim of each limitation.
- **Evaluation:**
 - **(Question)** Are the future works pointed out here insightful for you?
 - **(Hint)** Are they promising, important, interesting? The extent of improvement over the current work? Relevance to the community? Practicality?
 - **(Question)** Can you think of other potential future works?
 - **(Hint)** E.g., those link to your own research interests, from research and application perspectives.

1.18 Conclusion

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

- **Description**
 - **(Question)** What is the basic idea of the research problem?
 - **(Hint)** It is usually in the first couple of sentences of the section, with keywords like "investigate", "explore", "study", etc.
 - **(Question)** What are the takeaways from the author?
 - **(Hint)** They are usually in the last couple of sentences. Keywords like "conclude", "results show", "findings", "insights", "implications", "guidelines", "considerations", "suggestions", etc.
- **Analysis:**
 - **(Question)** Does this work well address the motivation proposed at the beginning?
 - **(Hint)** Compare the findings and the problem statements.
- **Evaluation:**
 - **(Question)** What are the strengths and weaknesses of the paper?
 - **(Hint)** Check and think of the key types of contributions vs. limitations/future work if mentioned.
 - **(Question)** Whether the authors overclaim their contributions?
 - **(Hint)** Would it be too strong / absolute? Has sufficient evidence?

1.19 Reference

- **Analysis:**
 - **(Question)** Are these references mainly from high-quality sources?

- **(Hint)** E.g., about the venue, citation, year, domain, etc.
 - **(Question)** Are these references up to date?
 - **(Hint)** Check publication year.
- **Evaluation:**
 - **(Question)** Whether the paper cites sufficient works in the same community?
 - **(Hint)** Identify the community of the venues and compare that to the target audience community claimed by the authors (and where the paper was published).