# Braun & Clarke's 6-Step Thematic Analysis: Friction in AI-Assisted Tasks

## A Combined Qualitative Study

**Research Question:** How does introducing friction (preparatory barriers) affect user engagement, trust, and critical evaluation in AI-assisted literature review and brainstorming tasks?

**Sample:** 41 participants (P1-P41), mixed design with Friction First (FF) and Friction Second (FS) conditions

**Analysis Method:** Braun and Clarke's 6-Phase Thematic Analysis

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# STEP 1: FAMILIARIZATION WITH DATA

## Data Overview

The combined dataset comprises 41 interview transcripts from participants completing AI-assisted tasks under two conditions:

- **Friction First (FF):** Tasks 1-2 with preparatory barriers, Tasks 3-4 without
- **Friction Second (FS):** Tasks 1-2 without barriers, Tasks 3-4 with preparatory barriers

## Task Types

1. **Literature Review:** Generate academic review with/without providing abstracts and citations
2. **Brainstorming:** Generate arguments with/without providing initial thoughts and counter-arguments

## Initial Observations

- Participants demonstrated varied responses to friction based on expertise and task importance
- Strong patterns emerged around control, trust, and cognitive investment
- Clear differences between task types in friction acceptance
- Expertise level significantly influenced critical evaluation abilities
- Users developed sophisticated strategies for AI interaction and evaluation

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# STEP 2: GENERATING INITIAL CODES

## 2.1 FRICTION EXPERIENCE CODES

**Positive Friction Effects**

| Code | Definition | Example Quote |
|---|---|---|
| **FRICTION_INCREASES_CONTROL** | Users feel more agency over AI output | "I felt control using the system. Yeah, I guess so because I could put what papers I wanted" (P22) |
| **FRICTION_ENABLES_GROUNDING** | Ability to verify output against known sources | "I actually know that these are all real references... I know that this is actually using real information" (P17) |
| **FRICTION_FORCES_ENGAGEMENT** | Required preparation increases thoughtful interaction | "putting your own thoughts and like looking at stuff yourself... you're gonna be a lot more careful" (P25) |
| **FRICTION_IMPROVES_SPECIFICITY** | More targeted and relevant outputs | "This is much more specific, much more focused" (P22) |
| **FRICTION_BUILDS_CONFIDENCE** | Trust through personal investment | "friction was a better choice according to me, because it was more relevant and it did increase my confidence in AI as well as in my own reasoning" (P37) |

## Negative Friction Effects

| Code | Definition | Example Quote |
|---|---|---|
| **FRICTION_AS_BARRIER** | Extra steps feel unnecessary or frustrating | "I think I should not do the work for the LLM the LLM should do the work for me" (P14) |
| **FRICTION_COGNITIVE_BURDEN** | Mental effort required for preparation | "It was a bit of a task, but I don't. I won't mind doing that if I need accurate and more relevant results" (P10) |
| **FRICTION_TIME_CONSUMING** | Process takes longer than desired | "Even though doing with steps was like the addition to was a little time consuming, but the final output was more in depth and detail" (P26) |
| **FRICTION_REDUNDANT_WORK** | Feels like doing AI's job | "It felt more frustrating to, you know, find the citation and add that's tracking" (P11) |

## 2.2 CRITICAL EVALUATION CODES

### Verification Behaviors

| Code | Definition | Example Quote |
|---|---|---|
| CRITICAL_FACT_CHECKING | Cross-referencing AI output with sources | "I would still go and validate if all the references that are given here is valid" (P24) |
| CITATION_VERIFICATION | Checking if references actually exist/are accurate | "if I was using this like on my day-to-day, I would definitely... first I would check that all the references it mentions actually exist" (P28) |
| CONTENT_VALIDATION | Assessing accuracy against domain knowledge | "I could compare it OK. The papers did talk about this and the AI is saying the same thing" (P19) |
| SOURCE_QUALITY_ASSESSMENT | Evaluating credibility of AI-cited sources | "I didn't see any hallucination and references. Also the reference is exactly what I put" (P30) |

## Trust and Skepticism

| Code | Definition | Example Quote |
|---|---|---|
| CAUTIOUS_RELIANCE | Using AI as starting point, not final answer | "I feel like it is a really good starting point... it's not gonna do the whole work for you" (P28) |
| DOMAIN_KNOWLEDGE_ADVANTAGE | Expert knowledge enables better evaluation | "Because I have knowledge in the field... I have that feeling of trust more" (P17) |
| HALLUCINATION_AWARENESS | Recognition of AI's tendency to fabricate | "All references wrong... I am having trust issues with these people now" (P39) |
| CONDITIONAL_TRUST | Trust depends on task importance and context | "it's reliable if you know how to use it properly, but it's not something that you can just copy and paste" (P38) |

## 2.3 COGNITIVE ENGAGEMENT CODES

### Active Participation

| Code | Definition | Example Quote |
|---|---|---|
| DEEPER_THINKING | Enhanced analytical processing | "I think for the for the for, for the first one with this with the without friction exercise, it just kind of read the response" (P32) |
| ACTIVE_PARTICIPATION | Collaborative engagement with AI | "in the first one and I feel like I barely had to think... But in the second one, it felt a little bit more like collaborating" (P28) |
| REFLECTIVE_ENGAGEMENT | Self-awareness of cognitive processes | "It made me to think more have my personal opinion, because usually I also do this with AI and sometimes I feel like... I kind of over rely on the thought of AI" (P33) |

**Cognitive Load Management**

| Code | Definition | Example Quote |
|---|---|---|
| ACCEPTABLE_COGNITIVE_COST | Friction worth it for better output | "if I have to put in like a bit more work, there is slight annoyance, but I also know that it would be a useful outputs" (P30) |
| EFFORT_JUSTIFICATION | Recognizing value despite extra work | "It is. See, even if just by giving an abstract when it is able to take the content... I guess it was. Much, much useful" (P41) |
| CONTEXT_DEPENDENT_EFFORT | Willingness varies by task importance | "Some tasks would require... it would be helpful and in fact more ideal to have the user itself describe all potential friction points" (P24) |

## 2.4 USER AGENCY AND CONTROL CODES

| Code | Definition | Example Quote |
|---|---|---|
| USER_CHOICE_PREFERENCE | Want choice in applying friction | "Choice... I would prefer if like which Adjectivity had this friction concept implicitly? Or would you prefer it to be like a choice for the user? Choice" (P34) |
| CONTROL_PERCEPTION | Importance of user involvement | "I really feel like it's very important to keep the user involved... The whole point of the research is you as a researcher, being passionate and driven" (P36) |
| AGENCY_PRESERVATION | Maintaining human oversight | "It should be on the users like the user should have control" (P25) |

## 2.5 AI RELATIONSHIP CODES

**Collaboration Patterns**

| Code | Definition | Example Quote |
|---|---|---|
| AI_AS_RESEARCH_PARTNER | Collaborative exploration of topics | "it felt more like... OK, based on what you're telling me right now, this is how we can build upon that" (P28) |
| AI_AS_STARTING_POINT | Foundation for further development | "most of the time I just take the insight from the AI and I'll just rewrite that that part" (P31) |
| AI_AS_WRITING_ASSISTANT | Using AI for drafting and editing | "I use it a lot for like thinking about structure, how am I going to structure this kind of piece of writing" (P17) |
| COLLABORATION_METAPHOR | Conceptualizing AI interaction | "It was like having a rubber duck. But then it's it's a smart duck" (P29) |

**Trust Development**

| Code | Definition | Example Quote |
|------|-----------|---------------|
| **EARNED_TRUST_THROUGH_TESTING** | Building confidence through verification | "I've done that like I've done that a bunch of times... So and then I've built that trust with it" (P17) |
| **TASK_IMPORTANCE_TRUST_CORRELATION** | Higher stakes = more verification | "I think this is very task dependent... Some tasks would require some tasks that are quite obvious" (P24) |
| **TRANSPARENCY_BUILDS_TRUST** | Knowing AI's sources increases confidence | "I felt like it was trustworthy because I'd, like, done a bit of the pre work" (P15) |

## 2.6 AI LIMITATIONS AND QUALITY CODES

| Code | Definition | Example Quote |
|------|-----------|---------------|
| **BIAS_RECOGNITION** | Awareness of AI biases | "I think it's biassed because even though it gives both perspectives... it highlights the pros more than the cons" (P34) |
| **GENERIC_RESPONSES** | AI outputs lack specificity | "it is just like didn't give out any facts... It's not stating anything, it is just giving an like a generic overview" (P35) |
| **SURFACE_LEVEL_CONCERN** | AI outputs too superficial | "the outputs were very surface level and I would probably have to like really critically evaluate everything" (P28) |
| **ECHO_CHAMBER_EFFECTS** | AI reinforces user inputs | "it feels exactly like an echo chamber because I don't see any additional points to counter or add to what I wrote" (P30) |

# STEP 3: SEARCHING FOR THEMES

## Initial Theme Candidates

Based on code frequency and conceptual relationships, six potential themes emerged:

1. **Friction as Cognitive Scaffolding for Enhanced Engagement**

2. **Contextual and Conditional Trust Development**

3. **User Agency and Control Preferences**

4. **Quality-Effort Trade-offs and Productive Cognitive Investment**

5. **Collaborative Human-AI Partnership Models**

6. **Critical Awareness of AI Limitations and Biases**

# STEP 4: REVIEWING THEMES

## Theme Validation Process

Each theme was reviewed against two criteria:

- **Internal Coherence:** Do the codes within each theme fit together meaningfully?

- **External Distinctiveness:** Are the themes clearly different from each other?

## Refinements Made:

- Merged cognitive load codes with context-dependent investment themes

- Clarified relationship between control and trust themes

- Ensured task-specific codes were distributed appropriately across themes

- Consolidated AI limitation awareness into a standalone theme

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# STEP 5: DEFINING AND NAMING THEMES

## THEME 1: FRICTION AS COGNITIVE SCAFFOLDING FOR ENHANCED ENGAGEMENT

*"Structured barriers that promote deeper thinking and critical evaluation"*

**Definition:** Friction mechanisms serve as cognitive scaffolding that prompts users to engage more thoughtfully with AI outputs, leading to increased critical evaluation, deeper processing of information, and enhanced learning.

**Supporting Codes:**

- FRICTION_FORCES_ENGAGEMENT

- DEEPER_THINKING

- ACTIVE_PARTICIPATION

- REFLECTIVE_ENGAGEMENT

**Key Characteristics:**

- Forces users to slow down and think critically

- Promotes active rather than passive interaction

- Enhances learning and understanding

- Builds analytical skills over time

**Representative Quotes:**

- "putting your own thoughts and like looking at stuff yourself... you're gonna be a lot more careful" (P25)

- "it kind of forced me to look through content and it forced me to kind of look through these studies" (P36)
- "friction was a better choice according to me, because it was more relevant and it did increase my confidence in AI as well as in my own reasoning" (P37)

## THEME 2: CONTEXTUAL AND CONDITIONAL TRUST DEVELOPMENT

*"Trust as a dynamic, task-dependent process rather than a fixed characteristic"*

**Definition:** User trust in AI systems is not monolithic but varies based on task type, domain expertise, perceived stakes, and previous experiences, with users developing sophisticated heuristics for when and how to rely on AI outputs.

**Supporting Codes:**

- CONDITIONAL_TRUST
- TASK_IMPORTANCE_TRUST_CORRELATION
- DOMAIN_KNOWLEDGE_ADVANTAGE
- EARNED_TRUST_THROUGH_TESTING

**Key Characteristics:**

- Trust varies by task importance and complexity
- Expertise influences trust calibration
- Trust develops through repeated testing
- Context determines verification strategies

**Representative Quotes:**

- "I think this is very task dependent... Some tasks would require some tasks that are quite obvious" (P24)
- "it's reliable if you know how to use it properly, but it's not something that you can just copy and paste" (P38)
- "anything having to do with actual language grammar stuff like that? I'm not critical of it at all" (P29)

## THEME 3: PRESERVING USER AGENCY AND CONTROL

*"The imperative to maintain human oversight and decision-making authority"*

**Definition:** Users value maintaining control over their interaction with AI systems and prefer having the choice to engage with friction mechanisms rather than having them imposed automatically, emphasizing the importance of user agency in AI design.

**Supporting Codes:**

- USER_CHOICE_PREFERENCE

- CONTROL_PERCEPTION

- AGENCY_PRESERVATION

- USER_AGENCY_PREFERENCE

**Key Characteristics:**

- Preference for optional rather than mandatory friction

- Importance of user choice in AI interaction

- Resistance to fully automated systems

- Value placed on human judgment and oversight

**Representative Quotes:**

- "Choice... I would prefer if like which Adjectivity had this friction concept implicitly? Or would you prefer it to be like a choice for the user? Choice" (P34)

- "I really feel like it's very important to keep the user involved... The whole point of the research is you as a researcher, being passionate and driven" (P36)

- "It should be on the users like the user should have control" (P25)

## THEME 4: PRODUCTIVE COGNITIVE INVESTMENT AND QUALITY-EFFORT TRADE-OFFS

*"Strategic allocation of mental effort for improved outcomes"*

**Definition:** Users are willing to invest additional cognitive effort when they perceive clear benefits in terms of output quality and reliability, viewing friction as a worthwhile trade-off that leads to better results and increased confidence.

**Supporting Codes:**

- ACCEPTABLE_COGNITIVE_COST

- EFFORT_JUSTIFICATION

- CONTEXT_DEPENDENT_EFFORT

- FRICTION_IMPROVES_SPECIFICITY

**Key Characteristics:**

- Willingness to invest effort for quality gains

- Strategic effort allocation based on task importance

- Recognition of quality-effort trade-offs

- Acceptance of cognitive burden when justified

**Representative Quotes:**

- "Even though doing with steps was like the addition to was a little time consuming, but the final output was more in depth and detail" (P26)
- "if I have to put in like a bit more work, there is slight annoyance, but I also know that it would be a useful outputs" (P30)
- "It is. See, even if just by giving an abstract when it is able to take the content... I guess it was. Much, much useful" (P41)

## THEME 5: COLLABORATIVE HUMAN-AI PARTNERSHIP MODELS

*"AI as augmentation tool rather than replacement solution"*

**Definition:** Users conceptualize effective AI interaction as a collaborative partnership where AI augments human capabilities rather than replacing human judgment, serving as a starting point for ideation and structure while maintaining human oversight.

**Supporting Codes:**

- AI_AS_RESEARCH_PARTNER
- AI_AS_STARTING_POINT
- AI_AS_WRITING_ASSISTANT
- COLLABORATION_METAPHOR

**Key Characteristics:**

- AI as collaborative partner, not oracle
- Iterative refinement of AI outputs
- Human oversight and final decision-making
- Augmentation rather than replacement philosophy

**Representative Quotes:**

- "I feel like it is a really good starting point... it's not gonna do the whole work for you" (P28)
- "most of the time I just take the insight from the AI and I'll just rewrite that that part" (P31)
- "It was like having a rubber duck. But then it's it's a smart duck" (P29)

## THEME 6: CRITICAL AWARENESS OF AI LIMITATIONS AND BIASES

*"Sophisticated understanding of AI capabilities and constraints"*

**Definition:** Users demonstrate sophisticated understanding of AI biases, limitations, and potential for errors, leading to the development of verification strategies, conditional trust, and appropriate skepticism in AI interactions.

**Supporting Codes:**

- BIAS_RECOGNITION
- HALLUCINATION_AWARENESS
- GENERIC_RESPONSES
- CRITICAL_FACT_CHECKING
- CITATION_VERIFICATION

**Key Characteristics:**

- Recognition of AI biases and limitations
- Development of verification strategies
- Appropriate skepticism and caution
- Understanding of AI's tendency to hallucinate

**Representative Quotes:**

- "I think it's biassed because even though it gives both perspectives... it highlights the pros more than the cons" (P34)
- "All references wrong... I am having trust issues with these people now" (P39)
- "I would still go and validate if all the references that are given here is valid" (P24)

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# STEP 6: PRODUCING THE REPORT

## Key Findings

### Hypothesis Testing Results

### H1: Friction reduces overreliance and increases critical engagement

- **STRONG SUPPORT** - Themes 1 and 6 demonstrate clear evidence of increased critical evaluation with friction
- Participants consistently reported more careful review of outputs with friction
- Enhanced verification behaviors and analytical thinking observed

### H2: Friction maintains/enhances perceived trustworthiness and usefulness

- **MIXED SUPPORT** - Theme 2 shows enhanced trustworthiness through transparency, but Theme 4 reveals tension around immediate utility

- Trust increased through grounding and user contribution
- Usefulness perception varied by individual and task context

### H3: Friction increases productive cognitive effort

- **STRONG SUPPORT** - Theme 4 directly addresses cognitive investment patterns
- Clear evidence of increased mental engagement with friction
- Users recognized cognitive cost but found it acceptable for important tasks

### H4: Friction maintains/improves UX despite increased cognitive effort

- **QUALIFIED SUPPORT** - Theme 3 shows UX acceptance depends on user choice and perceived value
- Positive UX when friction provided clear value and user control
- Negative reactions when friction felt imposed or unnecessary

### H5: General interpersonal trust affects AI trust

- **LIMITED EVIDENCE** - Theme 2 shows task-specific and earned trust development more influential
- Domain expertise appeared more influential than general trust tendencies

## Theoretical Contributions

1. **Friction Paradox:** Reveals fundamental tension between efficiency and effectiveness in AI interaction
2. **Contextual Trust Model:** Demonstrates how trust varies by task, expertise, and stakes rather than being a fixed user characteristic
3. **Cognitive Scaffolding Framework:** Shows how friction can enhance learning and critical thinking skills
4. **Human-AI Partnership Model:** Emphasizes collaboration over replacement paradigms
5. **User Agency Imperative:** Highlights the critical importance of user control in AI system design

## Design Implications

1. **Adaptive Friction Systems:** Implement user-controlled friction levels based on task importance and user expertise
2. **Transparency Features:** Provide clear source attribution and reasoning visibility
3. **Choice Architecture:** Design friction as optional features rather than mandatory barriers
4. **Progressive Disclosure:** Allow users to choose their level of engagement with AI processes
5. **Collaborative Interfaces:** Design for human-AI partnership rather than replacement models
6. **Trust Calibration Tools:** Help users develop appropriate trust levels for different contexts

## Future Research Directions

1. Investigate optimal friction levels for different task types and user expertise levels

2. Explore long-term effects of friction on AI literacy and critical thinking skills

3. Examine cultural and individual differences in friction acceptance and trust development

4. Study the relationship between friction design and learning outcomes

5. Investigate how friction affects expert vs. novice users differently

## Limitations

- **Sample Composition:** Primarily academic/research participants may not represent general population

- **Task Specificity:** Focus on literature review and brainstorming may not generalize to other AI applications

- **Short-term Exposure:** Single-session interactions may not capture long-term adaptation effects

- **Self-Report Bias:** Participant reports may not fully reflect actual behavior patterns

## Conclusion

This thematic analysis reveals that friction in AI-assisted tasks creates a complex landscape of trade-offs, trust development, and collaborative engagement. The six identified themes demonstrate that effective AI interaction design must account for individual expertise, task context, user agency preferences, and the inherent limitations of AI systems.

Rather than a simple barrier to efficiency, friction emerges as a potential tool for enhancing human-AI collaboration when thoughtfully implemented and user-controlled. The findings strongly support the value of friction for reducing overreliance and increasing critical engagement, while revealing important nuances around trust development, user experience considerations, and the imperative to preserve human agency.

The research contributes to our understanding of how to design AI systems that augment rather than replace human judgment, supporting more effective, trustworthy, and user-centered human-AI partnerships. The emphasis on user choice, contextual trust, and collaborative models provides a foundation for future AI interface design that respects both human capabilities and AI limitations.