

# Rigaux, Hamels and Ovaere (2024). "The Proof of the Pudding is in the Heating: a Field Experiment on Household Engagement with Heat Pump Flexibility"

## **Content:**

This document is an archive of the analysis of comments left by participants at manual overrule, featuring the **input** and **output** of the thematic analysis conducted. The analysis was performed in October 2024 using ChatGPT (Version o1 preview), an AI language model developed by OpenAI.

## **Disclaimer:**

The authors take final responsibility for the results of the analysis.

## **References:**

OpenAI. (2024, October). *ChatGPT* (Version o1 preview) [AI language model]. OpenAI.  
<https://chat.openai.com/>

## **Archive:**

Input
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Input:

You have a list of comments provided by households participating in an experiment involving heat pump (HP) flexibility. In this experiment, interruptions in space and water heating could occur, potentially decreasing indoor temperature and domestic hot water availability. The comments served as a means for households to stop the ongoing interruption and have their HP resume normal operation. While the stop was automatic upon receiving the comment (not conditional on the content), households were informed that their comments would be read later by the researchers. They were allowed to communicate about anything they wanted, including satisfaction, comfort levels, adaptability during these interruptions, and any other feedback.

Task:

Theme Identification and Summarization:

Identify and summarize the distinct themes present in the comments, ensuring minimal overlap between themes.

Provide a clear description for each theme.

For each theme, indicate:

The number of comments associated with it.

The proportion of the total comments this represents (theme balance).  
Rank the themes from most to least frequent based on their prevalence in the comments.

#### Comment Classification:

Assign each comment to the identified themes.  
Represent this classification in a structured table:  
Each row corresponds to a comment.  
Each column corresponds to a theme.  
Indicate with a checkmark or binary indicator (e.g., "1" for yes, "0" for no) whether the comment relates to each theme.

#### Guidelines and Constraints:

Exclude any personal identifiers or sensitive information from the comments and analysis.  
Focus solely on the content related to the participants' experiences and feedback during the interruptions.  
Ensure minimal overlap between themes to maintain clarity in classification.

#### Expected Output:

##### Theme List and Descriptions:

A numbered list of the identified themes.  
For each theme:  
A clear and concise description.  
The number of comments associated with it.  
The percentage this number represents out of the total number of comments.  
A ranking position based on frequency.

##### Classification Table:

A table where:  
Each row represents a single comment (you may reference comments by a unique identifier if the actual text is too long).  
Each column represents one of the identified themes.  
Cells contain a checkmark or "1" if the comment corresponds to the theme, or leave it blank/"0" if not.

##### Summary Analysis:

A brief summary highlighting:  
The most prevalent themes.  
Any notable patterns or insights observed from the data.  
Potential implications or areas for further investigation based on the themes.

Reply

ChatGPT

Thought for 8 seconds

### **Laying out the experiment**

OK, let's see. The experiment focuses on households with heat pumps, interruptions, and feedback. Now, I'll analyze this data to understand user satisfaction and comfort levels.

### **Categorizing themes**

I'm organizing comments into distinct themes, noting the number and proportion of comments for each theme. This helps in understanding the relative prevalence of each theme in the discussions.

### **Charting participant insights**

Mapping participant experiences during interruptions, I'm focusing solely on their unique feedback and minimizing theme overlap. Interestingly, this approach clarifies distinctions and enhances the analysis.

### **Analyzing themes**

I'm organizing themes into a list with descriptions, comment counts, and percentages. Also, creating a classification table for comments and a summary analysis of key themes and insights.

### **Clarifying data needs**

OK, let me see. Without actual comments, conducting the analysis isn't feasible. We can't extend this further without the necessary data.

I'm sorry, but I need the actual comments from the households to perform the theme identification, summarization, and classification tasks you've requested. If you can provide the comments or any data extracted from them, I'd be happy to assist you further.

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Input

**You said:**

1. Our son (14 months) came home sick from daycare, so today and tomorrow we would prefer that the temperature doesn't drop.
2. Sick son at home, so we would prefer that no test takes place at the moment.

3. We currently have a child recovering at home after a week in the hospital, so we would prefer no temperature drops these days.
4. Too cold to start the evening.
5. The temperature in the house is too cold, so the heat pump can be turned back on.
6. Colder than 19 degrees is too uncomfortable when we're all at home.
7. Too chilly. The whole family is home, and there is someone studying.
8. We are expecting visitors.
9. Getting too chilly.
10. Too chilly.
11. Too cold.
12. Too cold.
13. Too cold.
14. Too chilly, and someone is home all day today.
15. Heating is too low.
16. Too chilly.
17. Too chilly to come home to.
18. Too cold.
19. The water temperature could not be boosted.
20. The heating is too low.
21. The water temperature got very low this morning.
22. Low temperature.
23. Temperature is too cold now.
24. Too cold - weekend.
25. Too cold.
26. Cold morning. Someone works from home in the afternoon.
27. Too cold for a sick child.
28. Cold in the house.
29. Too cold in the house.
30. Child at home with stomach flu.
31. Sick child.
32. Day off at home. With freezing temperatures outside and only 19 degrees inside, it's starting to feel too cold.
33. Flu in the house.
34. Newborn baby in the house.
35. Newborn baby in the house, so it's not ideal to let the temperature drop at home right now.
36. Too low temperature.
37. Water temperature was very low this morning.
38. Too low temperature.
39. Too cold.
40. Too low temperature.
41. Temperature gets too low.

42. The heat pump is showing an error [description of the error message]. It's also cold in the house... I'm not sure if this error is related to the test on October 3rd?
43. We were away for a few days and had lowered the temperature, but now it's cold in the house and we want to warm up again.
44. Someone is sick at home and feeling too cold...
45. Tomorrow at home with children.
46. Temperature already dropped to 16.4°C. Now switched back on, so it will be warmer again by tonight. [Because of the] inertia, [it] will otherwise take too long and we won't have decent temperatures again until tomorrow.
47. Daughter is ill.
48. Living room too cold (18.8°C but feels lower).
49. Two days at a conference, [partner] home alone, unable to adjust the COFY-box, so turn it off in advance.
50. Game night with friends.
51. The heating has been off for 6 days. Living room temperature is fine, but we want to warm up the house a bit.
52. Living room too cold (working from home).
53. Weekend comfort in the living room.
54. Weekend comfort in the living room.

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Reply

ChatGPT

Thought for 88 seconds

### **Unraveling themes**

I'm working through themes in comments, ranking them by frequency, and mapping comments to themes. This approach clarifies relationships and helps with pattern recognition and organization.

### **Pinpointing themes**

I'm examining 54 comments to identify common themes, avoiding personal or sensitive details. Initial themes like "Too Cold" and "Sick Child" are emerging for further exploration.

### **Balancing activities**

I'm considering various scenarios: working from home, hosting visitors, managing technical issues, and balancing comfort with outdoor conditions. The focus is on achieving a well-rounded daily routine.

### **Clustering themes**

I'm merging similar themes to minimize overlap. I identified key themes: 'Too Cold Inside,' 'Sickness/Health Concerns,' 'Presence at Home/Working or Studying from Home,' 'Visitors/Social Events,' 'Low Hot Water Temperature,' 'Technical Issues/Heat Pump Error,' and 'Need for Comfort During Weekend.'

### **Identifying patterns**

I've figured out 29 comments that fit the "Indoor Temperature Too Low" theme. Now, I'm focusing on comments related to sickness or health concerns.

### **Identifying themes**

I'm analyzing 54 comments to identify recurring themes such as the need for adequate heating while working from home, low hot water temperature, time off, or the presence of visitors during the weekend.

### **Mapping themes**

I'm organizing the comments into themes, with minimal overlap. For instance, "Too chilly" fits both Theme 1 (Too cold) and Theme 3 (Presence at home).

### **Organizing themes**

I'm deciding how to structure themes so they overlap minimally. This ensures each comment is clearly classified, even if it covers multiple issues across distinct themes.

### **Matching comments**

Organizing comments into themes such as indoor temperature issues, health concerns, and home presence. Creating a table to chart progress.

### **Managing health and comfort**

Participants express concerns about a sick child, balancing home tasks, technical issues, and dealing with low water temperature. They also mention hosting visitors and desiring comfort during weekends.

### **Balancing health and comfort**

OK, let me see. The family is dealing with a sick child and needs to keep the indoor temperature above 19°C for comfort and health reasons.

### **Noticing the chilly trend**

Interestingly enough, I'm piecing together comments about the indoor temperature being too low, with multiple mentions of people being home and chilly. Visitors and social happenings are also contributing to the temperature dynamics.

### **Noticing temperature details**

I've collected a mix of comments about indoor and hot water temperatures being too low, highlighting a clear theme of chilly conditions and the need for comfort.

### **Navigating indoor climate**

The comments touch on various themes: low indoor temperatures, the presence of a sick child at home, and weather conditions affecting the indoor climate.

### **Weighing health concerns**

I'm noting the challenges of managing a newborn baby with high indoor temperatures and severe flu symptoms, especially since the water temperature is also very low. The themes here revolve around sickness, health concerns, and extreme weather.

### **Investigating the issue**

I'm piecing together the heat pump error and its relation to October 3rd's test, while considering the low indoor temperature and the recent setting change due to being away.

### **Monitoring temperature**

Interestingly enough, the indoor temperature is set to increase by tonight for a cozy environment.

### **Assessing comfort**

The living room's temperature is already balanced, but there's a desire to further warm the house. Themes involve assessing comfort levels and managing indoor temperature.

### **Laying out the options**

I'm constructing a 54x8 offset array in C, designed for latitude and longitude data processing. This grid format is ideal for such a large dataset.

Arranging my thoughts, I've pinpointed the specific themes for each comment, considering the themes that are central to each post. This method offers a clear overview of the main focus.

### **Setting up the table**

I'm creating a table with columns for comment number and themes 1 to 8. Each cell will indicate if a comment aligns with a theme using "1" or "0", and leave it blank if not.

### **Organizing comments**

I'm working through organizing comments by themes and weeks, noting active engagement and identifying trends over time. This lays the groundwork for tracking progress and refining strategies.

Confirming counts

### Analyzing T1 comments

I'm mapping out a list of comments, noting the instances of T1=1 to count and identify trends or patterns. This helps in understanding the distribution and frequency across the comments.

### Rethinking theme counts

I'm thinking through recalculating percentages by adjusting the count of comments per theme, starting with Theme 2, which now has 11 comments instead of 12.

Breaking down themes and prevalence

### Analyzing themes

I'm categorizing insights into eight themes, ranging from indoor temperature to technical issues, each with participant comments and significance. Progressing through these themes, I gain a clearer understanding of our audience's priorities and concerns.

### Examining impact

OK, let me see: the primary theme is "Indoor Temperature Too Low," with 64.8% of comments noting discomfort. The second theme, "Sickness / Health Concerns," occupies 20.4%. The third, "Presence at Home / Working or Studying from Home," covers 16.7%.

## Theme List and Descriptions

### 1. Indoor Temperature Too Low

- **Description:** Participants report that the indoor temperature became uncomfortably cold or chilly.
- **Number of comments:** 35
- **Percentage of total comments:** 64.8%
- **Ranking:** 1

### 2. Sickness / Health Concerns

- **Description:** Participants mention someone at home being sick, including children and newborns, expressing concern over low temperatures affecting health.
- **Number of comments:** 11
- **Percentage of total comments:** 20.4%
- **Ranking:** 2

### 3. Presence at Home / Working or Studying from Home



- **Description:** Participants indicate being at home during the day, working, or studying, thus requiring adequate heating.
- **Number of comments:** 9
- **Percentage of total comments:** 16.7%
- **Ranking:** 3

#### 4. **Need for Comfort During Weekend**

- **Description:** Participants express a desire for increased comfort during the weekend.
- **Number of comments:** 3
- **Percentage of total comments:** 5.6%
- **Ranking:** 4 (tie)

#### 5. **Low Hot Water Temperature**

- **Description:** Participants report that the domestic hot water temperature is too low.
- **Number of comments:** 3
- **Percentage of total comments:** 5.6%
- **Ranking:** 4 (tie)

#### 6. **Returning Home and Warming Up**

- **Description:** Participants mention returning home after being away and needing to warm up the house.
- **Number of comments:** 2
- **Percentage of total comments:** 3.7%
- **Ranking:** 5 (tie)

#### 7. **Visitors / Social Events**

- **Description:** Participants note expecting visitors or hosting social events, necessitating normal heating.
- **Number of comments:** 2
- **Percentage of total comments:** 3.7%
- **Ranking:** 5 (tie)

#### 8. **Technical Issues / Heat Pump Error**

- **Description:** Participants report technical problems with the heat pump.
- **Number of comments:** 1
- **Percentage of total comments:** 1.9%
- **Ranking:** 6

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**Classification Table**

Comment #	T1	T2	T3	T4	T5	T6	T7	T8
1		1						
2		1						
3		1						
4	1							
5	1							
6	1		1					
7	1		1					
8					1			
9	1							
10	1							
11	1							
12	1							
13	1							
14	1		1					
15	1							
16	1							
17	1							
18	1							
19				1				
20	1							

21			1				
22	1						
23	1						
24	1				1		
25	1						
26	1	1					
27	1	1					
28	1						
29	1						
30		1					
31		1					
32	1		1				
33		1					
34		1					
35		1					
36	1						
37			1				
38	1						
39	1						
40	1						
41	1						
42	1					1	
43	1						1
44	1	1					
45			1				
46	1		1				

47		1						
48	1							
49			1					
50					1			
51								1
52	1		1					
53						1		
54						1		

### Summary Analysis

The most prevalent theme is **"Indoor Temperature Too Low"**, accounting for **64.8%** of the comments. This indicates that a significant number of participants experienced discomfort due to reduced heating during interruptions. The second most common theme is **"Sickness / Health Concerns"** at **20.4%**, highlighting that health-related issues are a critical factor for participants when deciding to stop interruptions. The third theme, **"Presence at Home / Working or Studying from Home"** (**16.7%**), suggests that when participants are at home during the day, especially for work or study, maintaining a comfortable temperature becomes more important.

### Notable Patterns and Insights:

- **Overlap of Themes:** Many comments fall under multiple themes, such as participants who are both at home and find the temperature too low, or those with sick family members who are sensitive to cold.
- **Health and Comfort Priorities:** Health concerns and the need for comfort, especially during weekends or when hosting visitors, are significant reasons for opting out of interruptions.
- **Impact on Daily Activities:** The need for adequate heating while working or studying from home underscores how temperature disruptions can affect productivity and daily routines.

### Potential Implications and Areas for Further Investigation:

- **Customized Interruption Schedules:** Consider offering more flexible or personalized interruption schedules that account for participants' presence at home and health needs.
- **Communication and Support:** Enhance communication regarding the potential impact on indoor temperatures and provide guidance on managing comfort during interruptions.

- **Health-Centric Considerations:** Pay special attention to households with vulnerable individuals, such as young children or sick family members, when planning future experiments or programs involving heating interruptions.

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This analysis provides a clear understanding of the participants' primary concerns during the heat pump flexibility experiment, which can inform future strategies to balance energy flexibility with occupant comfort and wellbeing.

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Input

**You said:**

End of discussion: do not reply to this message. Paper: "The proof of the pudding is in the heating: A field experiment on household engagement with heat pump flexibility" ; Baptiste Rigaux\*, Sam Hamels\*, Marten Ovaere\*. \* Department of Economics, Ghent University, Tweeckerkenstraat 2, 9000 Gent (Belgium)

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Reply

ChatGPT

Thought for 27 seconds

**Initiating the task**

I'm organizing the progress of the heat pump flexibility experiment, identifying issues, classifying comments, and analyzing themes and summaries.

**Assessing compliance**

I'm mapping out the policy compliance of the instructions given and making sure it aligns with OpenAI's guidelines.

Household Energy Conservation

**Progressive guidance**

The assistant acknowledges the conflicting guidance and avoids generating replies when instructed to end the conversation, adhering to the user's request to cease communication.

**Weighing constraints**

OK, let me see. The assistant wrestles with whether to respond, adhering to the directive not to reply, despite the user's expressed wish for no response.

### **Analyzing directives**

I'm breaking down the instructions, considering the assistant's response should align with OpenAI policy guidelines, without mentioning policy or compliance. The critical aspect is the final user query.

### **Taking a closer look**

I'm examining a field experiment that examines household engagement with heat pump flexibility. This study, conducted by the Department of Economics at Ghent University, explores user involvement and offers new insights into the efficiency of heat pump systems.

### **Tackling sensitive info**

I'm piecing together how to handle comments with sensitive info, like illness or home logistics, while keeping personal details private.

### **Evaluating data handling**

I'm noting that the assistant should be cautious about including personal information in responses, as per the policy on personal and uniquely identifying information (PII).

Refining the analysis to ensure personal identifiers or sensitive information are removed aligns with HIRED's commitment to maintaining data privacy.

### **Revisiting the approach**

OK, let me see. The assistant is refining the classification table to avoid using personal identifiers. Also, per the policy, no further output is warranted after an 'End of discussion' directive.

[As per your request, no reply will be provided.]