Human-Computer Interaction

Qualitative Data Analysis

Professor Bilge Mutlu

Questions

To ask questions during class:

» Go to slido.com and use code **#2938904** or direct link or scan QR code

» Anonymous

» I will monitor during class

Today's Agenda

» Topic overview: *Qualitative Data Analysis*

» Hands-on activity

Qualitative Data Analysis Mehtods

- Content analysis
- Discource analysis
- Narrative analysis
- **Thematic analysis**
- **Grounded Theory**

What is Grounded Theory?[1][2]

- An *approach* to describe relationships where little is known or to provide a fresh take on existing knowledge
- A *method* to systematically build integrated sets of concepts from systematically obtained empirical data
- A *process* of composing knowledge through intimate contact with subjects, events
- A *theory* that is shaped by data as well as by the researcher
- HCI research adopts Grounded Theory as a systematic and rigorous method to analyze qualitative data

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[1] Glaser, B. G. and Strauss, A. The Discovery of Grounded Theory. Aldine DeGruyter, 1967.

[2] Strauss, A. L. and Corbin, J. Basics of Qualitative Research. Sage Publications, 1990.

What are key characteristics of Grounded Theory?

- **Induction:** Theory emerges from data.[3]
- **Fit:** Theory generated must:
  - *Fit* the data: categories should emerge from the data; data should not be forced into pre-existing categories.
  - Be *relevant*: theory should explain, interpret, predict phenomena.
  - Be *adaptable*: theory should be modifiable based on new data.
- **Subjectivity:** Subjectivity can be minimized by (1) keeping an open mind, thinking comparatively, studying multiple viewpoints, and perdiodically asking big

[3] *Inductive* approaches to research aim to generate theory, and *deductive* approches to research aim to test theory.

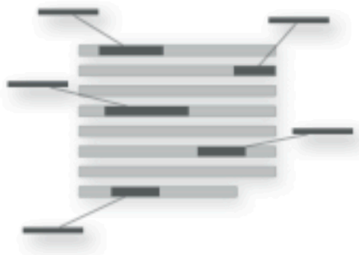
How do we conduct Grounded Theory?

» Reading a textual database, including fieldnotes, interview transcripts, and other data that is translated into textual form

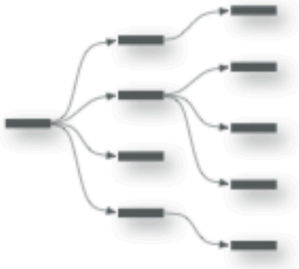
» Discovering and labeling variables

» Identifying and modeling relationships

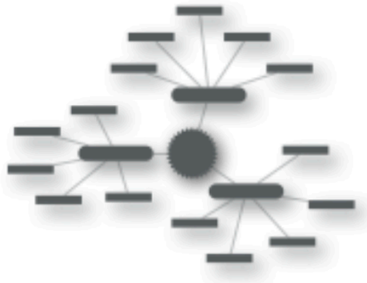
The Grounded Theory Process



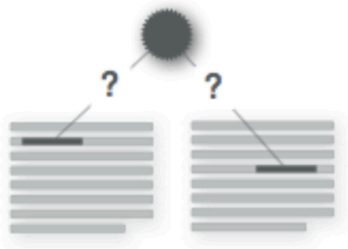
Open Coding



Axial Coding



Selective Coding

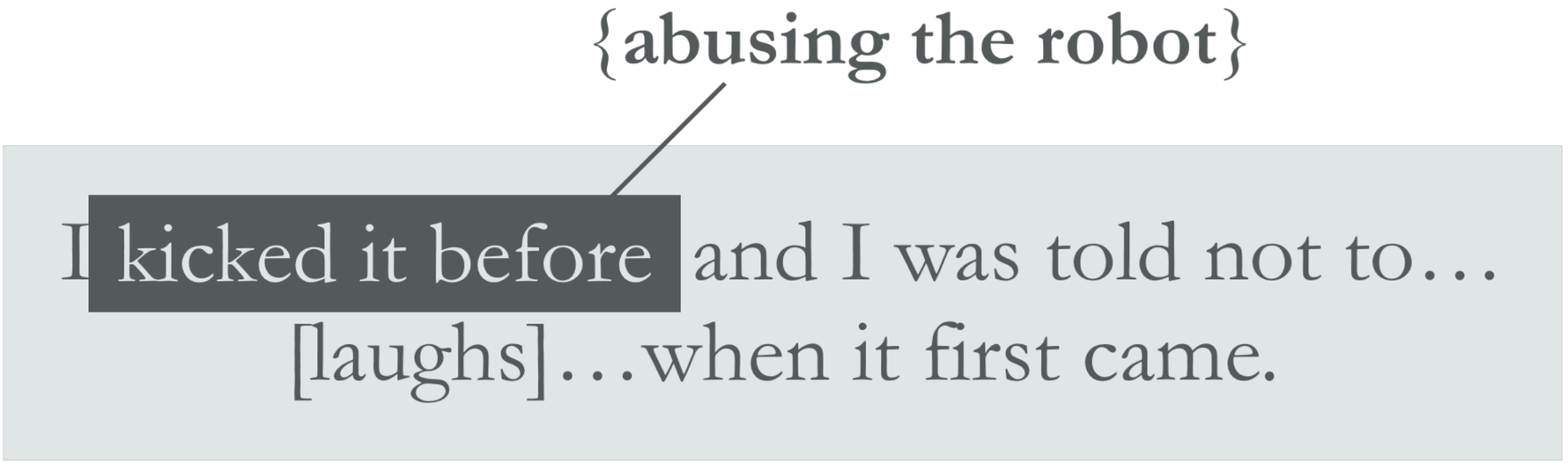


Comparative Analysis

Theory Building

Open Coding[4]

Coding for concepts that are significant in the data as abstract representations of events, objects, relationships, interactions, etc.



[4] Mutlu, B. & Forlizzi, J. (2008). Robots in Organizations: Workflow, Social, and Environmental Factors in Human-Robot Interaction.

How do we ensure objectivity of coding?

Reliability analysis measures the extent to which independent coders evaluate a behavior to reach the same conclusion.

What are some measures of reliability?

» *Agreement among coders*: Measures how much coders agree as percentage of coded segments

» *Cohen's* κ: Takes into account agreement that could happen by change

» *Fisher's* κ, *Krippendorff's* α: Alternatives to Cohen's κ

How do we calculate Kappa?

$$\kappa = \frac{P(a) - P(e)}{1 - P(e)}$$

κ: Cohen's Kappa

$P(a)$: Probability of *observed* agreement

$P(a)$: Probability of *chance* agreement

How do we interpret Kappa values?

» < 0 — *no agreement*

» 0–.20 — *slight*

» .21–.40 — *fair*

» .41–.60 — *moderate*

» .61–.80 — *substantial*

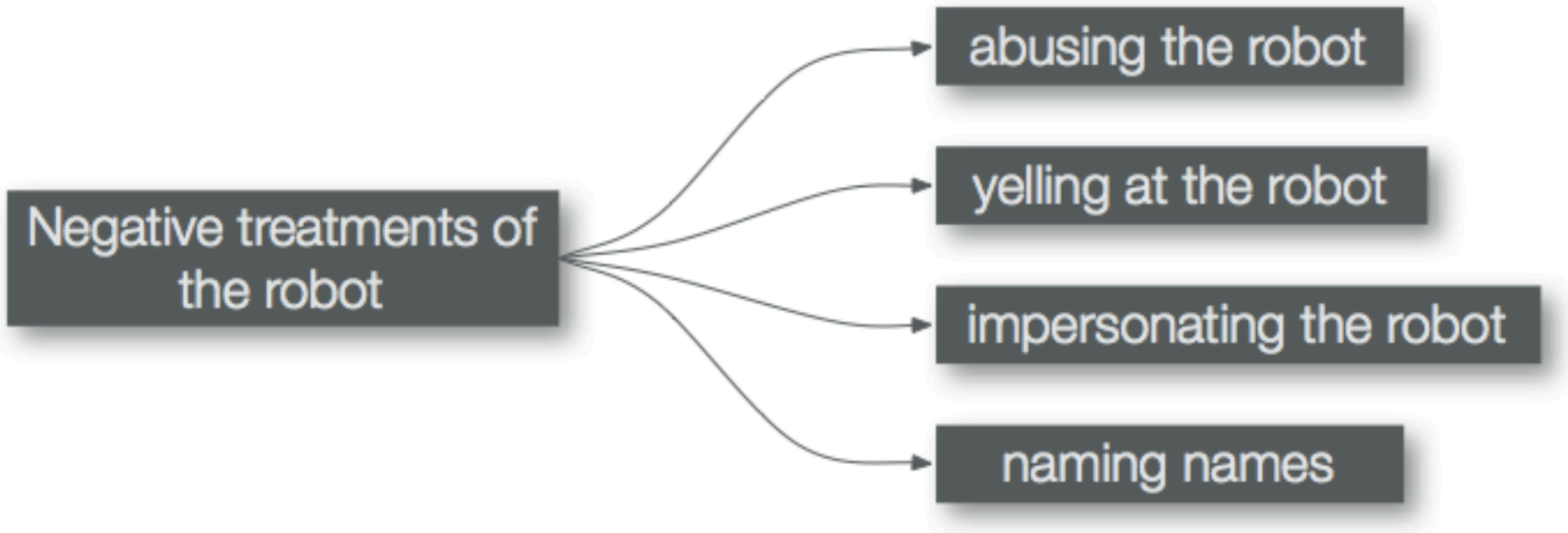
» .81–1.00 — *almost perfect*

What process do we follow to test reliability?

1. Choose your measure (e.g., Cohen's κ)
2. Determine minimum level of reliability ($\kappa \geq .80$)
3. Identify your *reliability sample* (e.g., 10% of the full sample)
4. Train another coder and ask the coder to code the reliability sample
5. Calculcate reliability (iterative process: retrain, recode, recalculate)
6. Report inter-rater reliability

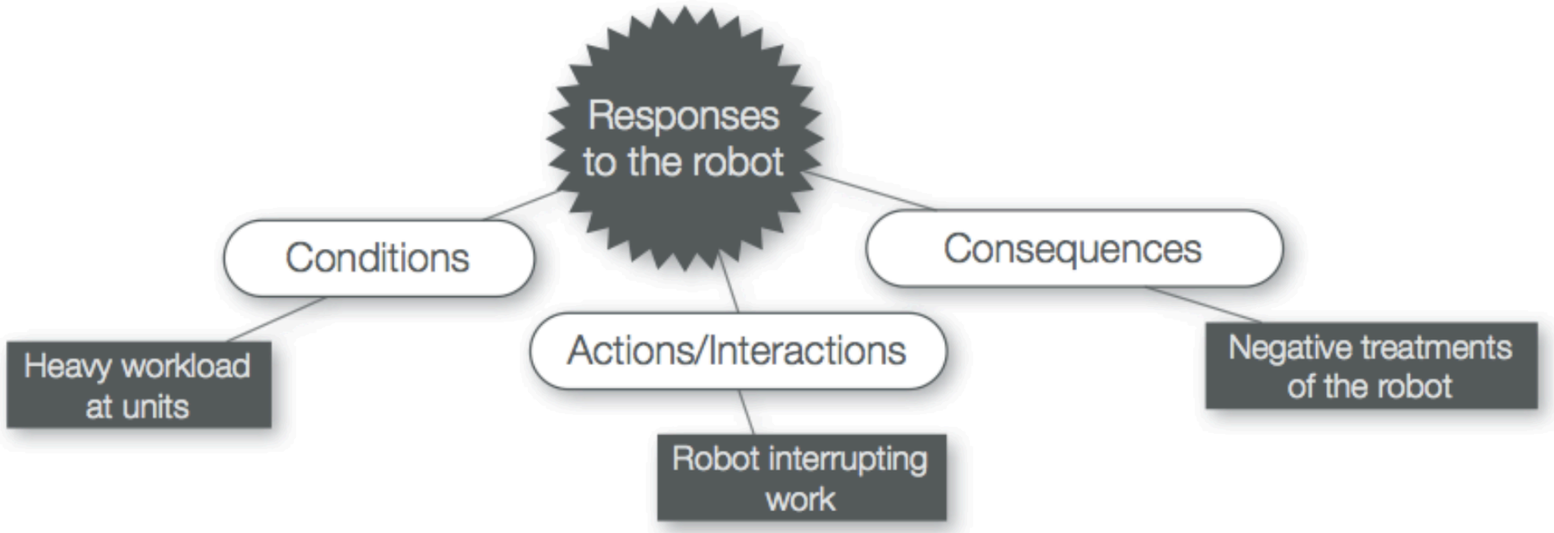
Axial Coding

Concepts are categorized into explanations of arising phenomena (e.g., repeated events, actions, interactions)



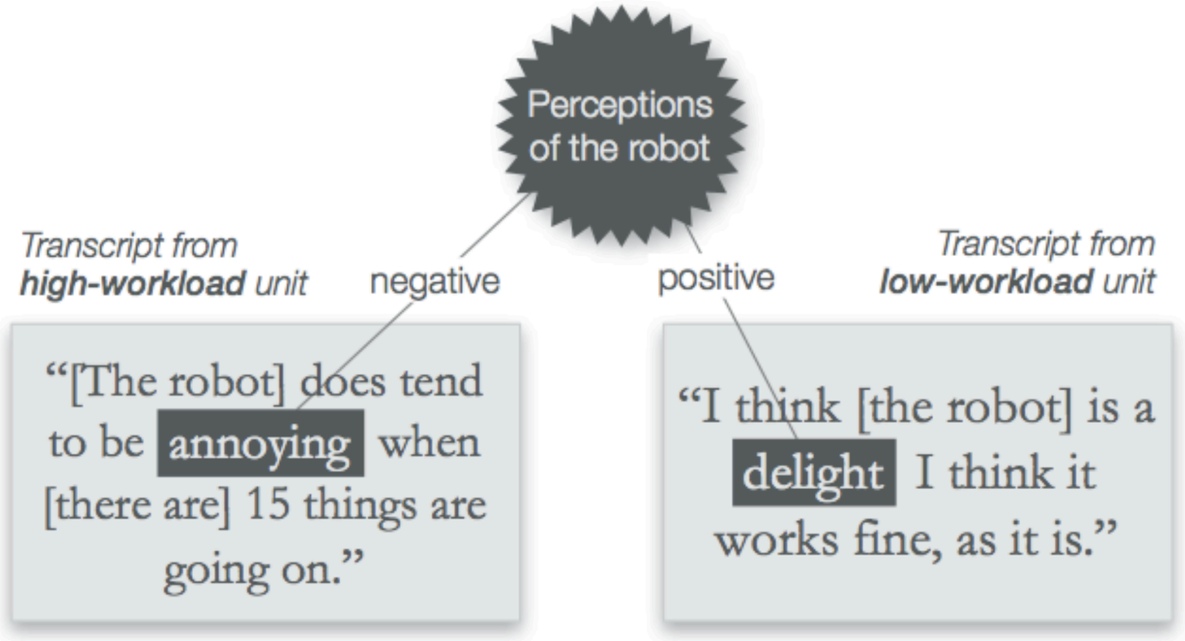
Selective Coding

Categories are classified into *conditions*, *actions/interactions*, and *consequences* (templates that help us establish causal relationships) and relationships among categories are established to generate several individual models.



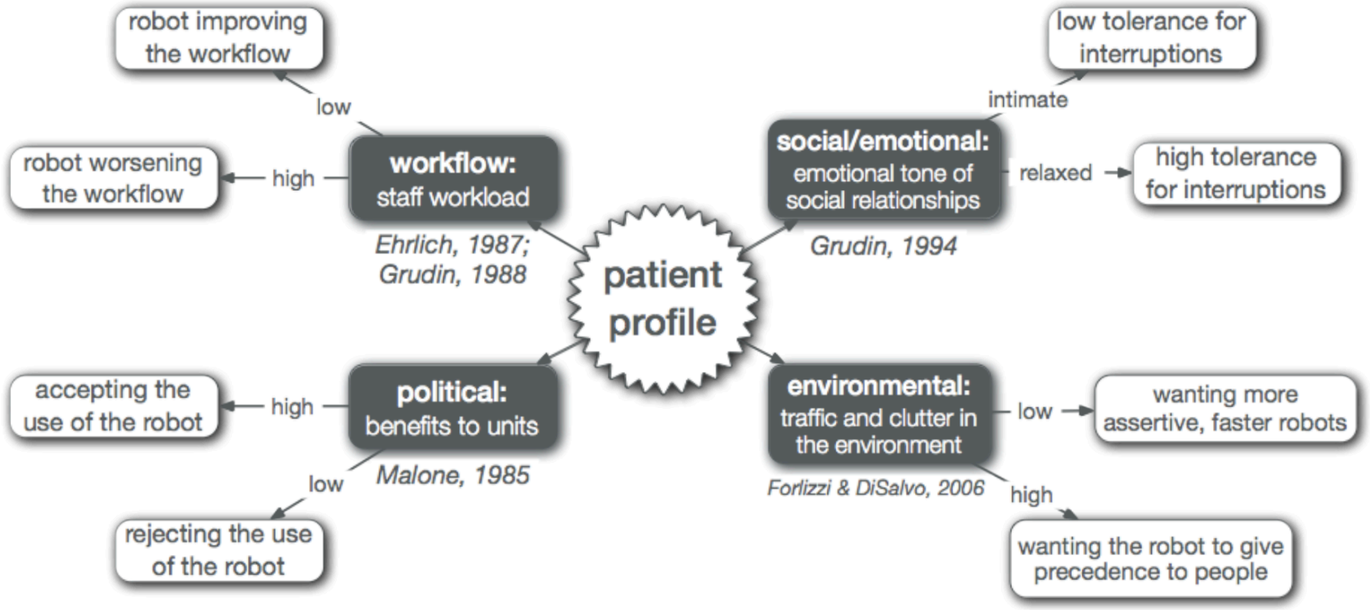
Comprative Analysis

Each phenomenon is compared across several dimensions to understand how it is affected by social, physical, or organizational structures.

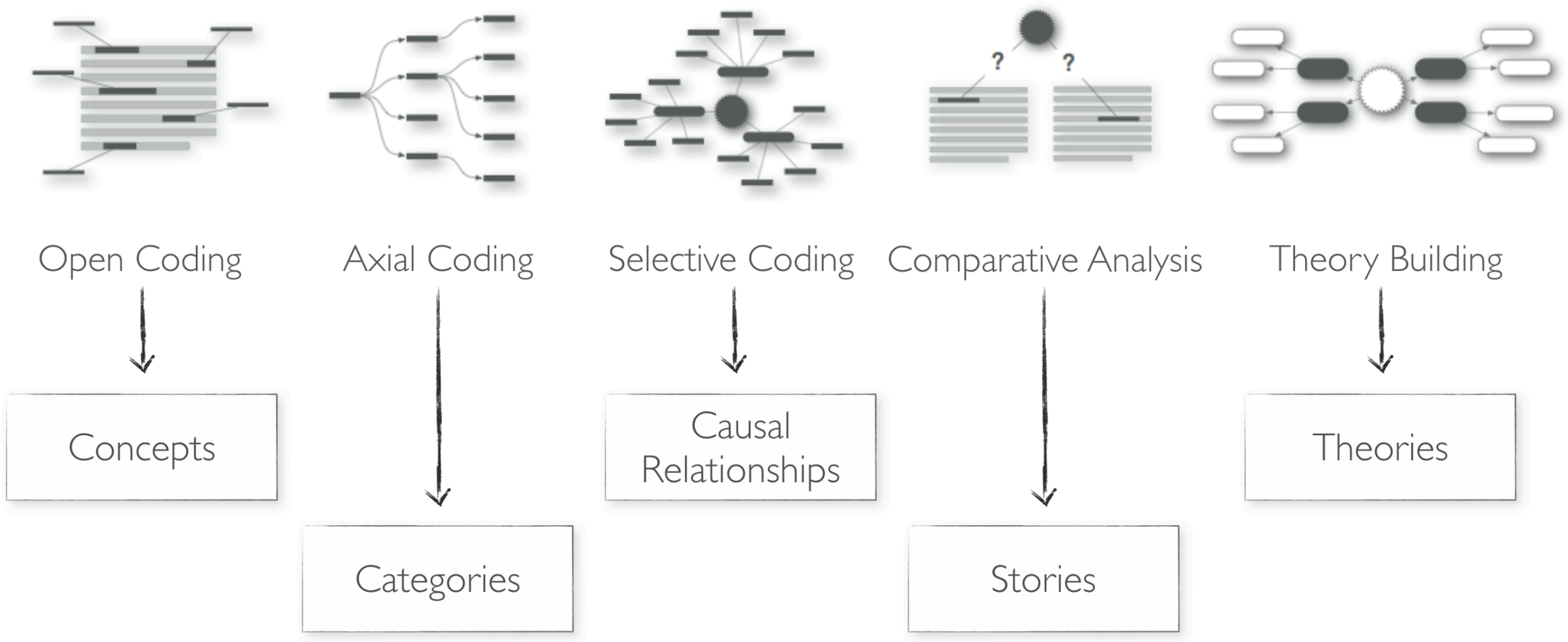


Theory Building

A final theoretical model (or models) is constructed based on the results of the comparative analysis; existing theory is embedded in this model.

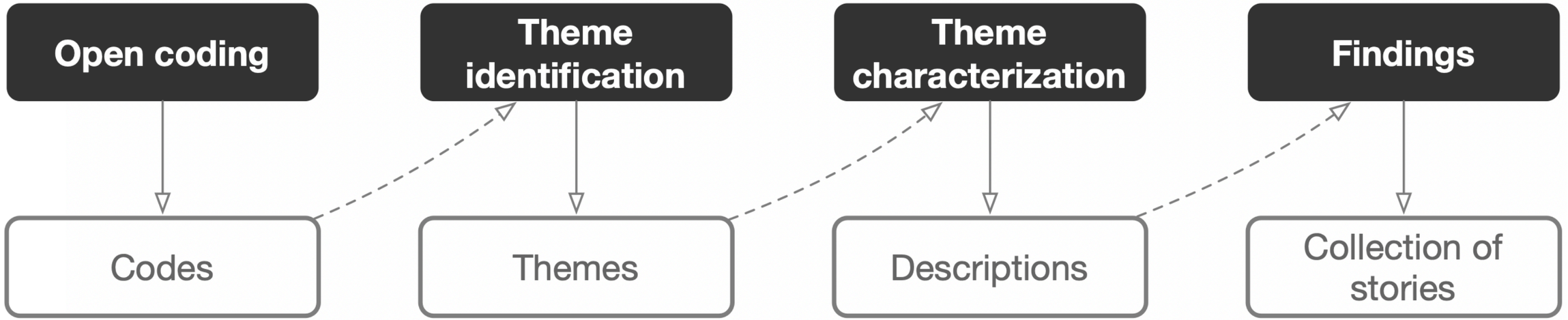


Recap of the Grounded Theory Process



Thematic Analysis

Using the same techniques, we can utilize a *simplified* process:



Method Selection

When is thematic analysis or Grounded Theory appropriate?

Grounded Theory

» Building substantive theory

» Studying social phenomena

Thematic Analysis

» Qualitative evaluations of systems

» Triangulation

Hands-on Activity: Open Coding

- 30-min activity to practice **qualitative data analysis**
  - Conduct open coding of interview data
  - Calculate inter-rater reliability
  - Work in pairs using the activity handout
  - Submit PDF to Canvas