ECE1724H S2: Empirical Software Engineering

Qualitative Data Analysis

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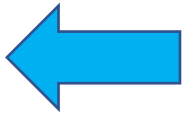
Data Collection Procedures – Qual. Study

- Identify the purposefully select individuals and sites for the study
- Indicate the number of sites and participants to be involved in the study
- Select the type(s) of data to be collected
  - Qualitative observations
  - Qualitative interviews
  - Qualitative documents
  - Qualitative audio-visual materials

Creswell. Research Design.

Interview

Agenda for Today

- Your interviews 
- Qualitative data analysis
- Paper reading presentation

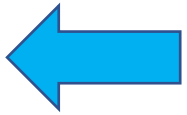
HW3 - Interviews

1. Purpose, Research Question(s)
2. The process of developing interview protocol
3. How did your interviews go?
4. Reflection:

What you learned about the topic you picked, how the interviews went, any problems or lessons you can share


WHAT'S
NEXT
?

Agenda for Today

- Your interviews
- Qualitative data analysis 
- Paper reading presentation

Planning Checklist

- [x] Pick a topic
- [ ] Identify the research question(s)
- [ ] Check the literature
- [ ] Identify your philosophical stance
- [ ] Identify appropriate theories
- [ ] Choose the method(s)
- [ ] Design the study
  - Unit of analysis?
  - Target population?
  - Sampling technique?
  - Data collection techniques?
  - Metrics for key variables?
  - Handle confounding factors
- [ ] Critically appraise the design for threats to validity
- [ ] Get IRB approval
  - Informed consent?
  - Benefits outweigh risks?
- [ ] Recruit subjects / field sites
- [ ] Conduct the study
- [ ] Analyze the data
- [ ] Write up the results and publish them
- [ ] Iterate

Transcription

- Verbatim (“word for word”)

- Selective

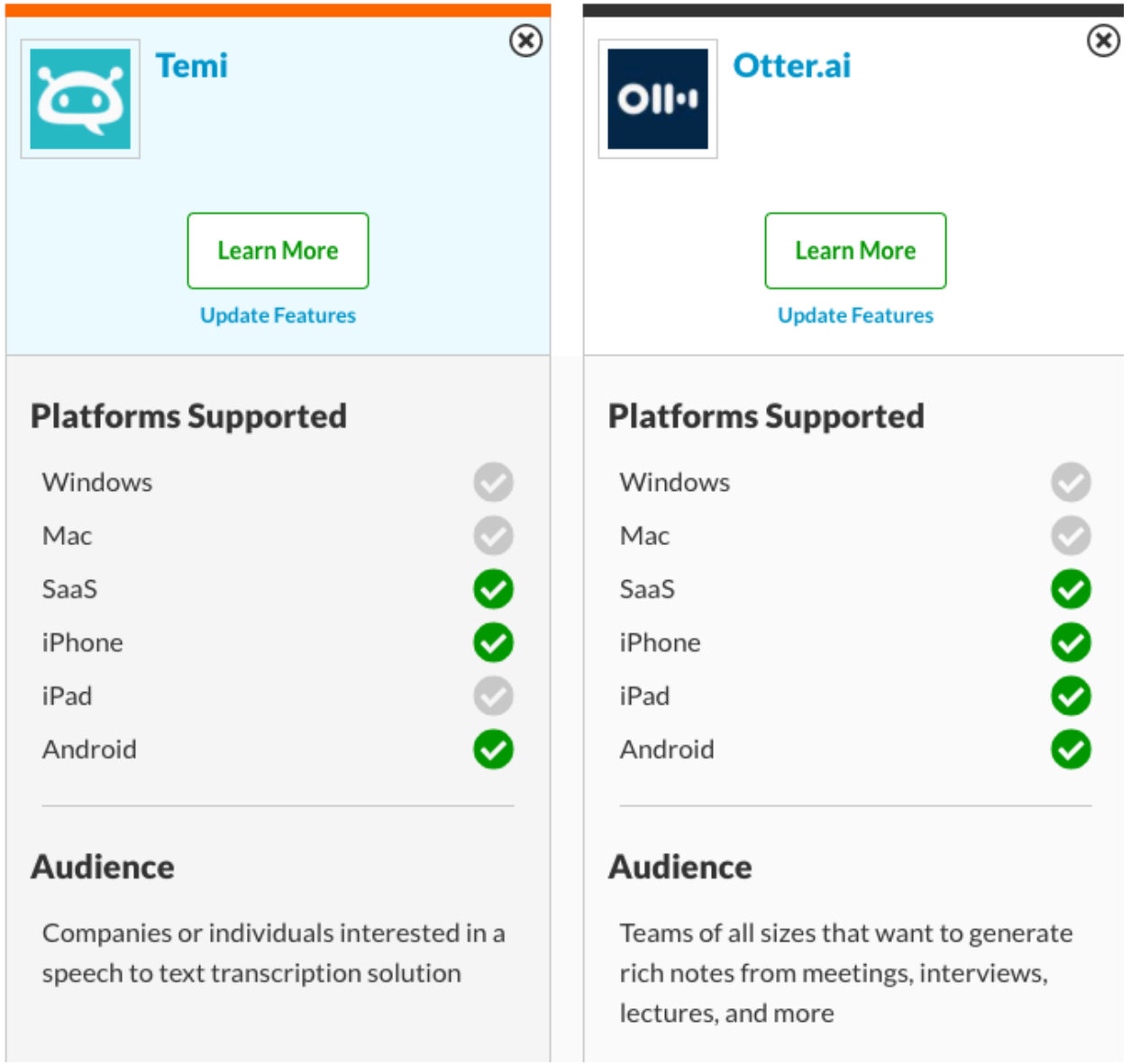
Importance of an annotation system – to ensure accuracy in transcription work

I: Where did you meet him?

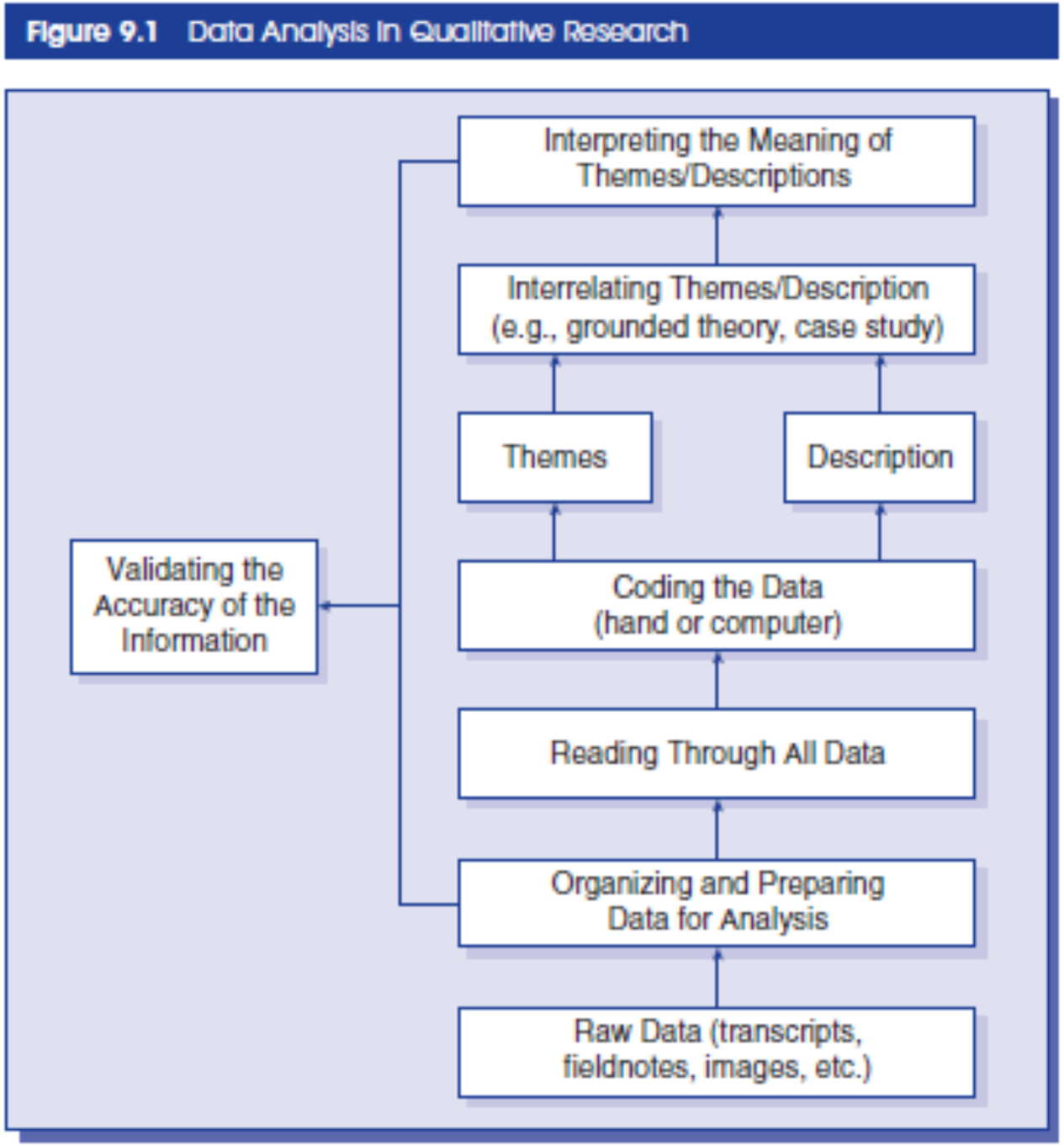
P: Hmmm…let me think…I went to the park and then I saw him [pause] [laughter]. He was wearing a strange outfit [laughter] (inaudible segment for 5 seconds)

Tools

- Temi https://www.temi.com/
- https://otter.ai



Data Analysis in Qualitative Research



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Techniques of Qualitative Analysis

- Narrative Analysis
- Phenomenological research
- Grounded Theory 
- Case study & ethnographic research
- …

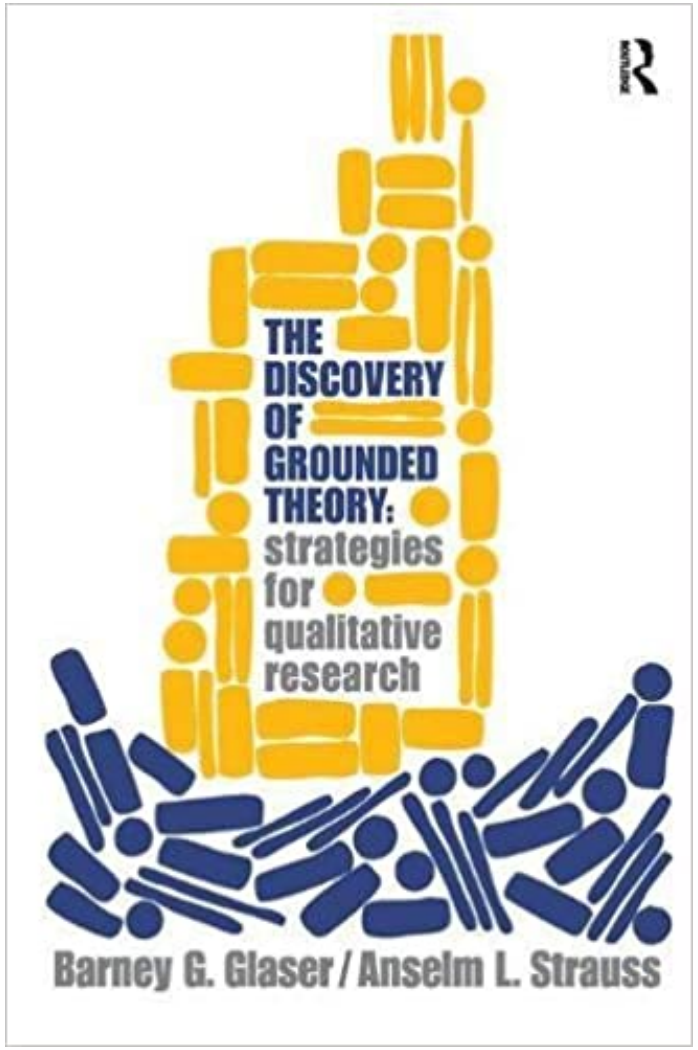
Grounded Theory

- Focus on generating theoretical ideas (or hypotheses) from the data
- rather than having these specified beforehand

"A grounded theory is one that is inductively derived from the study of the phenomena it represents."

-- Strauss and Corbin. p23

Key focus = reflective reading of text and the application of codes



Grounded Theory

- Piles of qualitative data, mostly text
  - What to do with it?
  - From journalism to science – how?
- Step 1: Abstraction
  - Attach “codes” (labels) to chunks of data
  - Characterize / summarize the data
- Step 2: Theory building
  - Use these abstractions to craft a theory
  - Interpret the data
- This is difficult, but very doable with practice

Data Analysis in Qualitative Research

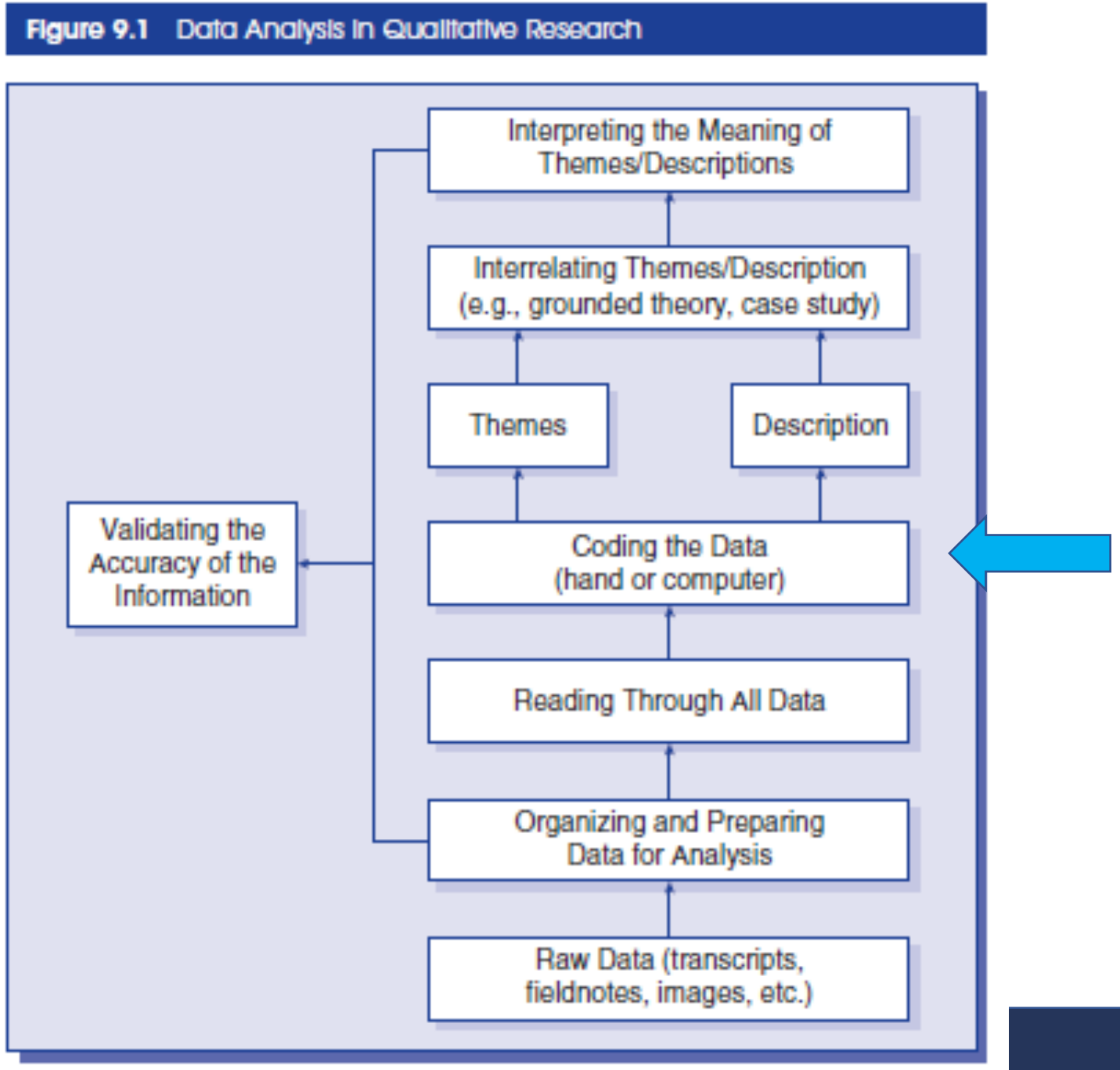


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Table 9.4 Tesch's Eight Steps in the Coding Process

1. Get a sense of the whole. Read all the transcriptions carefully. Perhaps jot down some ideas as they come to mind as you read.
2. Pick one document (i.e., one interview)—the most interesting one, the shortest, the one on the top of the pile. Go through it, asking yourself, "What is this about?" Do not think about the substance of the information but its underlying meaning. Write thoughts in the margin.
3. When you have completed this task for several participants, make a list of all topics. Cluster together similar topics. Form these topics into columns, perhaps arrayed as major, unique, and leftover topics.
4. Now take this list and go back to your data. Abbreviate the topics as codes and write the codes next to the appropriate segments of the text. Try this preliminary organizing scheme to see if new categories and codes emerge.
5. Find the most descriptive wording for your topics and turn them into categories. Look for ways of reducing your total list of categories by grouping topics that relate to each other. Perhaps draw lines between your categories to show interrelationships.
6. Make a final decision on the abbreviation for each category and alphabetize these codes.
7. Assemble the data material belonging to each category in one place and perform a preliminary analysis.
8. If necessary, recode your existing data. (pp. 142–149)

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Tesch (1990)

Data Analysis and Interpretation

Step 3. Start **coding** all of the data

- Codes on topics that readers would expect to find, based on the past literature and common sense
- Codes that are surprising and that were not anticipated at the beginning of the study
- Codes that are unusual, and that are, in and of themselves, of conceptual interest to readers
- Develop codes *only* on the basis of the emerging information
- Use predetermined codes and then fit the data to them
- Use some combination of emerging and predetermined codes

Types of Coding - Examples

[1]I asked the principal what the need for the new program was, and he responded that the students coming into the 9th grade were two years below grade level and that the old curriculum was ineffective. Through testing (the Nelson Reading Test) it was determined that students were growing academically only 5 or 6 months during the 10-month school year.

[1]MOTIVATION

Challenges:

- To make sense of massive amounts of data
- To reduce the volume of information
- To identify significant patterns
- To construct a framework to communicate what the data reveals

Coding stages

- First Cycle
  - Three elemental method: Descriptive, In Vivo, Process coding
- Second Cycle

Types of Coding – Example (1)

Descriptive

[1]As I walked toward the school, there was a 7-11 convenience store 1 block away, next to a small professional office building: an optometrist, podiatrist, and other medical/health-related clinics. Directly across the street was an empty lot, but next to that stood a Burger King restaurant.

[1]BUSINESSES

Types of Coding – Example (2)

In vivo:

- Short quote as code

I [1] hated school last year. Freshman year, it was awful, I hated it. And [2]this year's a lot better actually I, um, don't know why. I guess, over the summer I kind of [3]stopped caring about what other people thought and cared more about, just, I don't know.

[1]"HATED SCHOOL"

[2] "THIS YEAR'S BETTER"

[3] "STOPPED CARING"

Types of Coding – Example (3)

- Process:
    - Actions (“-ing” words)

Well, that’s one problem, that [my school is] pretty small, so 1 if you say one thing to one person, and then they decide to tell two people, then those two people tell two people, and in one period everybody else knows. 2 Everybody in the entire school knows that you said whatever it was. So. . . .

1 SPREADING RUMORS

2 KNOWING WHAT YOU SAID

Coding stages

- First Cycle
  - Three elemental method: Descriptive, In Vivo, Process coding
  - **Three affective methods**: Emotion, Values, Evaluation coding
- Second Cycle

Types of Coding – Example (4)

- Emotion:
  - Experienced by participant or inferred by researcher

[1]I just hated it when he got awarded with the honor. 2 I mean, we're praising mediocrity now. Never mind that what you've accomplished isn't worth squat, it's all about who you know in the good ol' boys network.	[1]"HATED IT" [2]BITTERNESS

Types of Coding – Example (5)

- Values (V), attitudes (A), beliefs (B):

[1] Government regulation of women's health issues has gotten out of hand. It's not about "protecting" us, it's about their need to control and dominate women [2] through covert religious ideology. White Christian men are deciding what's law and what's moral and what's, how it's supposed to be. [3] They can say, "It's not a war on women" all they want, but trust me—it's a war on women.

[1] B: GOVERNMENTAL CONTROL

[2] B: COVERT RELIGIOUS MOTIVES

[3] A: MISOGYNIST MOTIVES

Types of Coding [Cont.]

- Evaluation Coding
- Dramaturgical Coding
- Holistic Coding
- Provisional Coding
- Hypothesis Coding
- Protocol Coding
- Causation Coding
- .....

Definitions of Selected Codes

Site Dynamics and Transformations-TRANS	
Event chronology—official version: TRANS-CHRON/PUB	Event chronology during initial and ongoing implementation, as recounted by users, administrators or other respondents.
Event chronology—subterranean version: TRANS-CHRON/PRIV	Event chronology during initial or ongoing implementation, as recounted by users, administrators or other respondents, and suggesting (a) a consensual but different scenario than the public version or (b) varying accounts of the same events.
Changes in innovation: TRANS-INMOD	Reported modifications in components of the new practice or program, on the part of teachers and administrators, during initial and ongoing implementation.
Effects on organizational practices: TRANS-ORG/PRAC	Indices of impact of new practice or program on: (a) intraorganizational planning, monitoring, and daily working arrangements (e.g., staffing, scheduling, use of resources, communication among staff) and (b) interorganizational practices (e.g., relationships with district office, school board, community, and parent groups).

Illustration of a Start List of Codes

CATEGORY: INNOVATION PROPERTIES	ABBREVIATION: IP-OB J
IP: OBJECTIVES	IP-OC
IP: ORGANIZATION	IP-ORG/DD, LS
IP: IMPLIED CHANGES-CLASSROOM	IP-CH/CL
IP: IMPLIED CHANGES-ORGANIZATION	IP-CH/ORG
IP: USER SALIENCE	IP-SALIENCE
IP: (INITIAL) USER ASSESSMENT	IP-SIZUP/PRE, DUR
IP: PROGRAM DEVELOPMENT (IV-C)	IP-DEV

References

Miles, M.B, Huberman, A.M., & Saldana, J. (2014) Qualitative Data Analysis: A Methods Sourcebook. 3d Ed. Sage: Los Angeles.:

- Ch. 4: Fundamentals of Qualitative data analysis.
- Ch. 11: Drawing and Verifying Conclusions.

Coding stages

- First Cycle
  - Three elemental method: Descriptive, In Vivo, Process coding
  - **Three affective methods**: Emotion, Values, Evaluation coding
- Second Cycle 
  - Pattern coding

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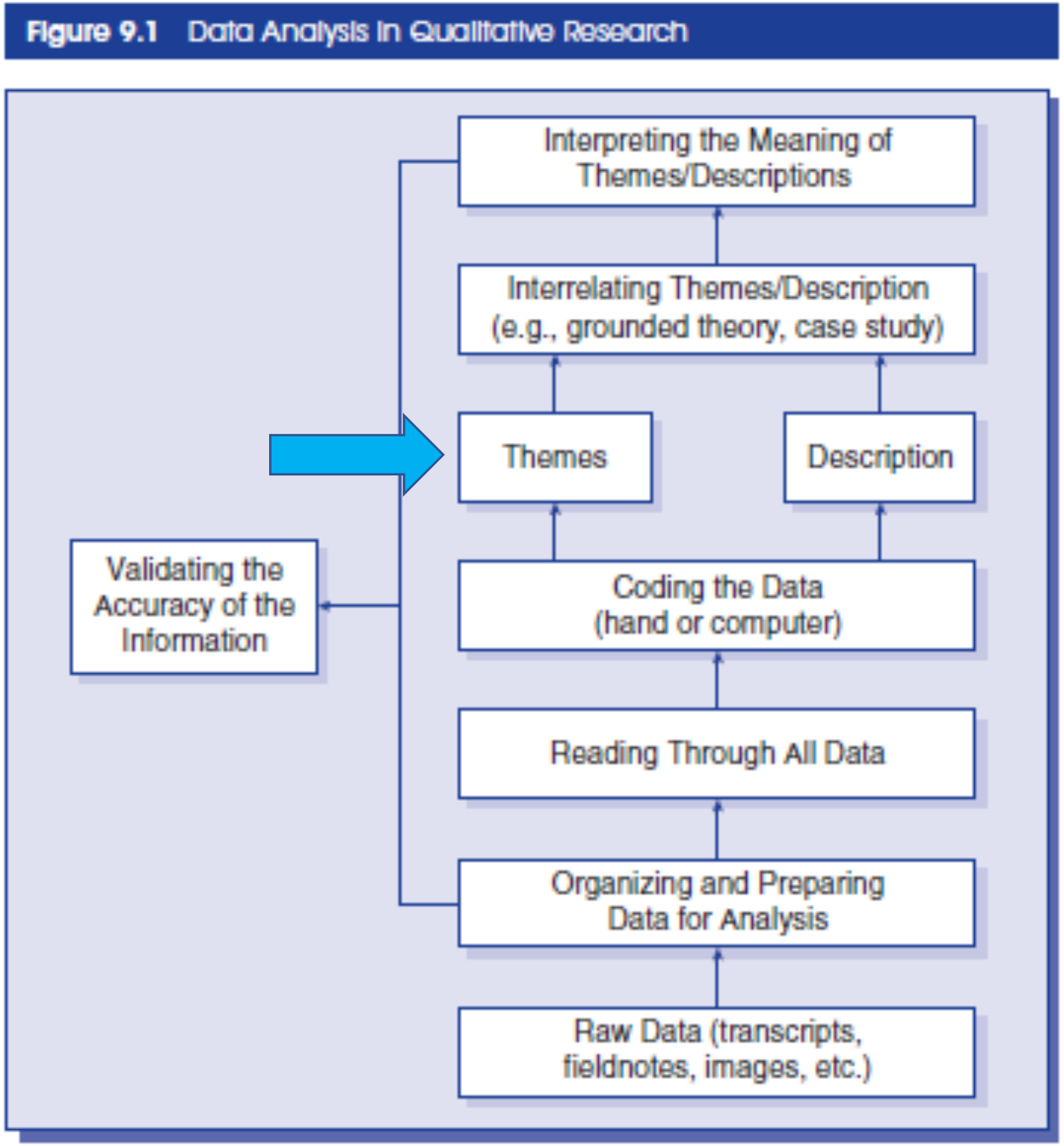

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From Codes to Patterns

- Finding patterns:
  - Categories/themes
  - Causes/explanations
  - Relationships among people
  - Theoretical constructs

A selected series of codes related to the **first month of withdrawal symptoms described by a participant voluntarily participating in a smoking cessation treatment program**, in random order and with their First Cycle code types indicated:

Exercise -- Find patterns in the following codes:

- ANXIETY
[emotion]
- NERVOUSNESS
[emotion]
- RESTLESSNESS
[emotion]
- DEEP BREATHING
[process]
- THROAT BURNING
[process]
- “FELT LIKE CRYING
[in vivo/emotion/process]
- ”HURT SOMEONE BAD”
[in vivo/emotion]
- ANGRY
[emotion]
- ”EATING A LOT MORE”
[in vivo/process]
- WANDERING AROUND
[process]
- HABITUAL MOVEMENTS
[descriptive]
- MEMORIES OF SMOKING
[descriptive]
- SMELLING NEW THINGS
[process]

Exercise -- Find patterns in the following codes:

- ANXIETY [emotion]
- NERVOUSNESS [emotion]
- RESTLESNESS [emotion]
- DEEP BREATHING [process]
- THROAT BURNING [process]
- “FELT LIKE CRYING [in vivo/emotion/process]
- ”HURT SOMEONE BAD” [in vivo/emotion]
- ANGRY [emotion]
- ”EATING A LOT MORE” [in vivo/process]
- WANDERING AROUND [process]
- HABITUAL MOVEMENTS [descriptive]
- MEMORIES OF SMOKING [descriptive]
- SMELLING NEW THINGS [process]

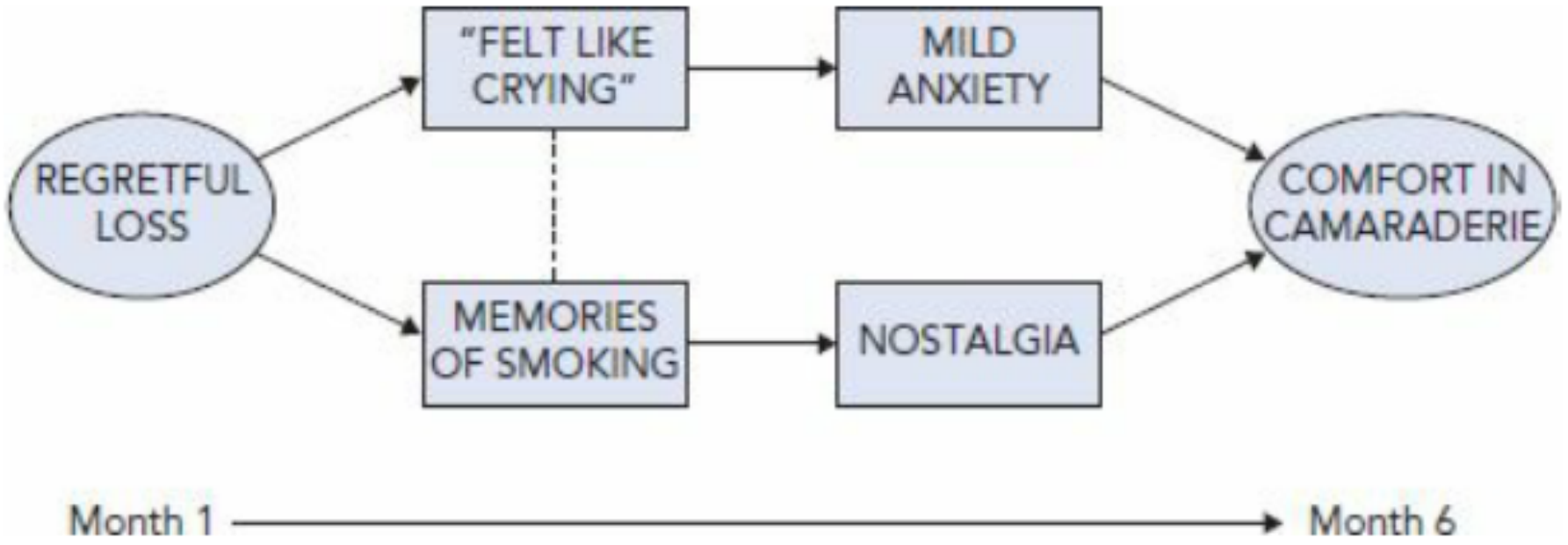
Exercise -- Find patterns in the following codes (Cont):

- **(Cluster 1) PHYSICAL CHANGES:** DEEP BREATHING, THROAT BURNING, “EATING A LOT MORE,” SMELLING NEW THINGS
- **(Cluster 2) RESTLESS JOURNEY**: WANDERING AROUND, HABITUAL MOVEMENTS
- **(Cluster 3) REGRETFUL LOSS** : “FELT LIKE CRYING,” MEMORIES OF SMOKING

Exercise -- Find patterns in the following codes (Cont):

Initiating Smoking Cessation Patterns	Month 1	Month 6
NEGATIVE EMOTIONS	Anxious, nervous, angry, aggressive	Occasionally anxious
PHYSICAL CHANGES	Gained 5 pounds, felt "burning" sensation in throat and lungs	On weight loss program after gaining 20 pounds, heightened sense of smell
RESTLESS JOURNEY	Wandering and habitual movements	Habitual movements
REGRETFUL LOSS	"Felt like crying," hyper-conscious of cessation	Nostalgic for smoking, "hangs around" smokers

Exercise -- Find patterns in the following codes (Cont):



Tactics for Generating Meaning

- Noting patterns, themes
- Seeing plausibility
- Clustering
- Making metaphors
- Counting
- Making contrasts/comparisons
- Partitioning variables
- Subsuming particulars into the general
- Factoring
- Noting the relations among variables
- Finding intervening variables
- Building a logical chain of evidence
- Making conceptual/theoretical coherence

Tools?

EXAMPLE

REACTION

It was really good. There was a variety of activities, the overhead and information where they talked about it, and the opportunity to practice the activities together. I liked it. The 5 hours went really quickly. We had a good group, and felt very comfortable because everyone was open and sharing. And the lunch was wonderful. Having lunch was a good idea.

STRUCTURE ACTIVITIES

COMFORT LEVEL

Yes, the structure helped my grasp the information, and I enjoyed the group size and variety of activities. 5.5 hours was good enough, and it went quickly. It all seemed to follow their outline, and it gave the opportunity to listen and then practice and get to know other people, because I was there by myself.

STRUCTURE VARIETY

SOCIAL NETWORKING

ONSITE (SOCIAL ASPECT)

I think I would have gotten the same information either way with the overheads and printouts, but the interpersonal and opportunity to relate to other people and have back and forth and the ability to ask questions was more personal and enjoyable. In a webinar, I don't feel comfortable asking questions to someone I don't know, so the personal, face to face was better than if I did the webinar. I imagine I would have gotten the same information, but it wouldn't have been as enjoyable, and without the activities and other people's questions, I probably wouldn't remember as much.

FACE-TO-FACE VS REMOTE

ONSITE IMPACT

1. What was your overall impression of the training in terms of its usefulness to your work?

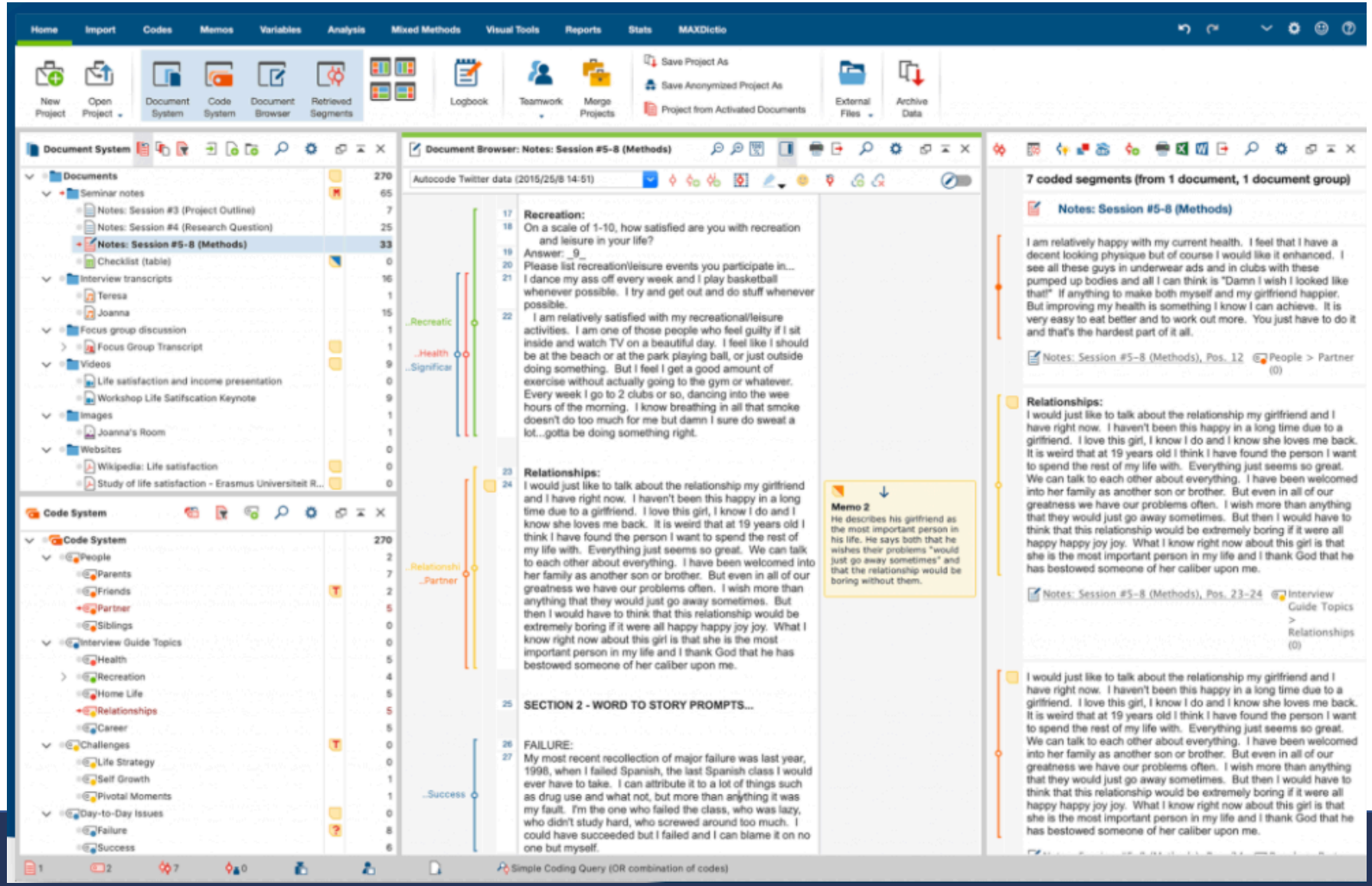
REACTION

It is great because I do survey development and work with people that develop surveys. It was really helpful. Afterward, I analyzed surveys and it made me wish I had attended the training before, because now I know there's better ways to do it. Yes, it has definitely met my expectations

EXPECTATIONS

MAXQDA
The Art of Data Analysis

www.maxqda.com

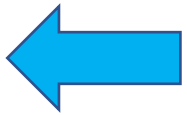


https://www.youtube.com/watch?v=CofyuDZwso0&feature=youtu.be

ATLAS.ti - Qualitative Data Analysis

https://www.youtube.com/watch?v=yjBN88HMbTs

Agenda for Today

- Your interviews
- Qualitative data analysis
- Paper reading presentation 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