

# How do people make sense of unfamiliar visualizations?

A Grounded Model of Novice's Information Visualization Sensemaking

CPSC 547 Paper Presentation  
Rex Chang  
November 24, 2015

# What?

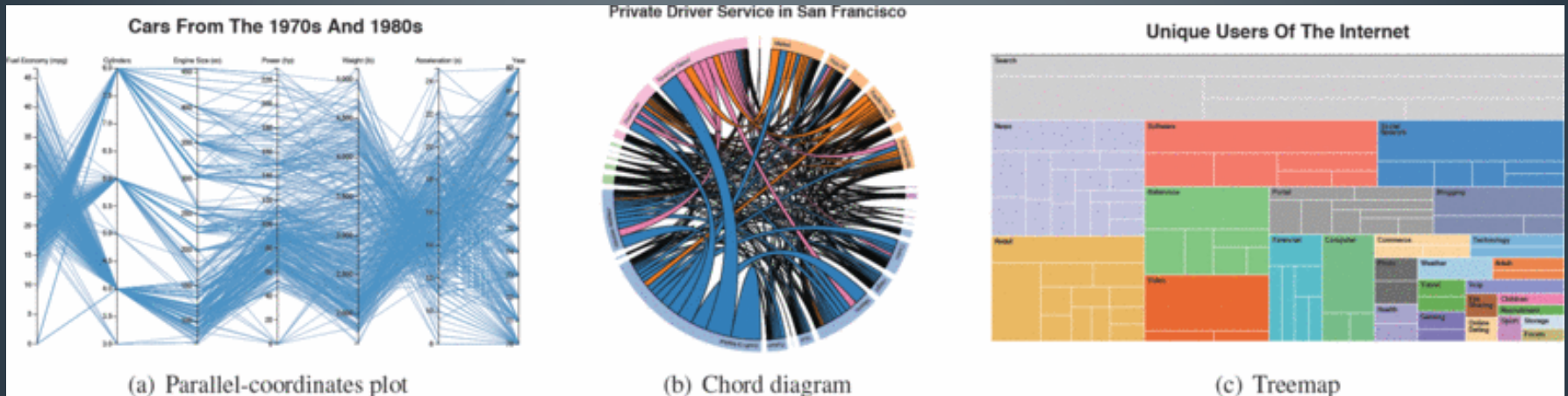
- How do People Make Sense of Unfamiliar Visualizations?: A Grounded Model of Novice's Information Visualization Sensemaking
- IEEE Transactions on Visualization and Computer Graphics, VOL. 22, NO. 1, January 2016
- Authors
  - Sukown Lee, Ya-Hsin Hung, and Ji Soo Yi – Purdue University, USA
  - Sung-Hee Kim – University of British Columbia
  - Heidi Lam – Google Tableau
  - Youn-ah Kang – Yonsei University, South Korea

# Why?

- Visualizations – Assist people to carry out tasks more effectively
- Visualizations need to **make sense** to the user
- Understanding how people make sense of **unfamiliar** visualizations helps with vis design and evaluation

# The Study

- 3 Visualizations
  - Parallel Coordinate Plot (PCP), Chord Diagram (CD), Tree Map (TM)



- 3 Think-Aloud Observations
- Semi-Structured Interview

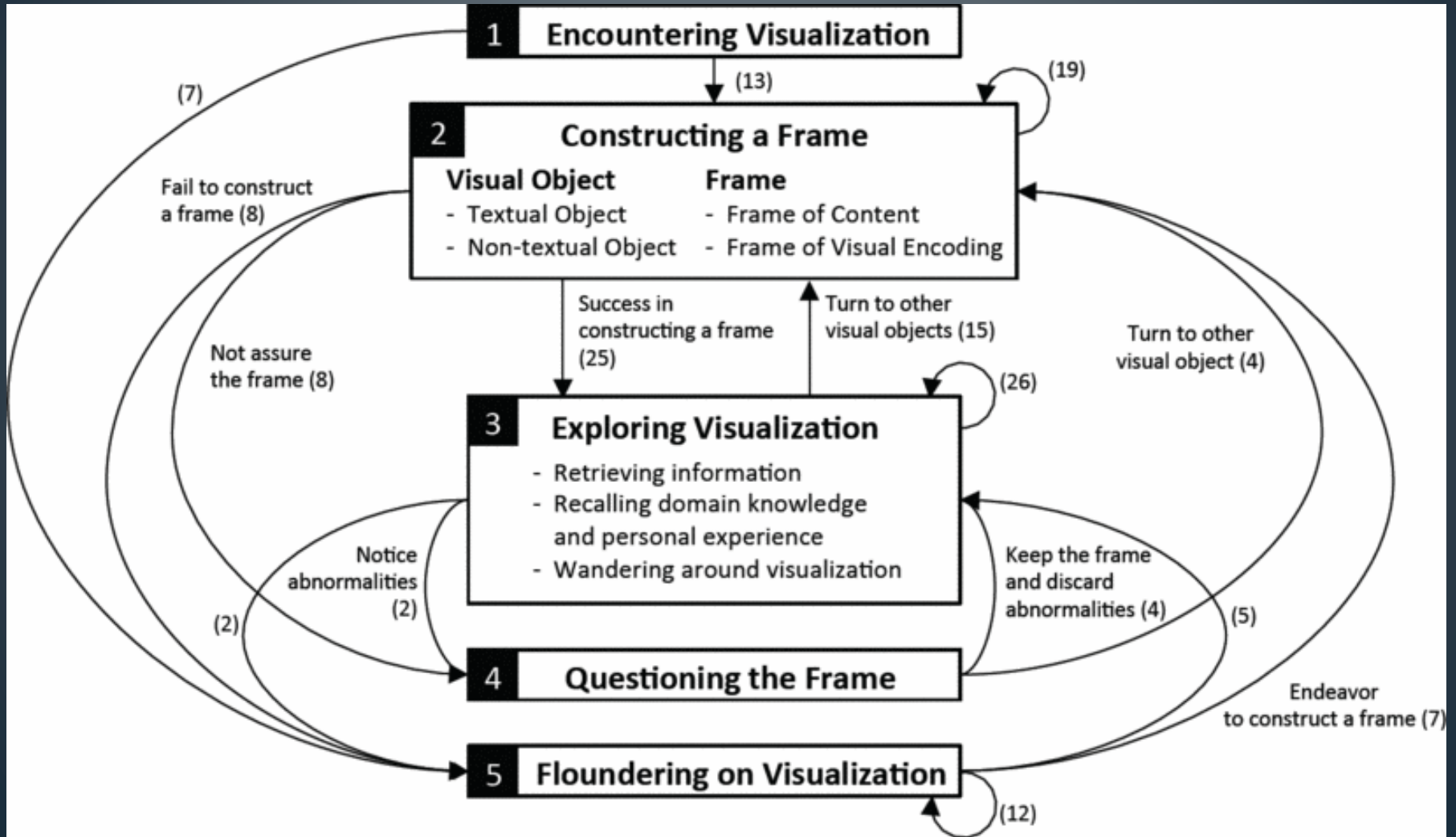
# Participants

- 13 Participants
- Undergraduate students and university staff members
- Native English speakers
- Basic computer skills

# Data Analysis

- Data Pre-Screening
  - Exclude Non-Novice users
  - Removed 5 sessions
  - 34 valid sessions for analysis
- Grounded Theory Method
  - Not based on an existing model or framework
  - Open Coding:
    - Code repeated words/ideas
    - Categories from affinity diagrams
  - Axial Coding: Identify high-level phenomena and central ideas
  - Selective Coding: Conceptualize central phenomenon – NOVIS model (Novice's information Visualization Sensemaking)

# NOVIS Model



# Encountering the Visualization

## 1 Encountering Visualization

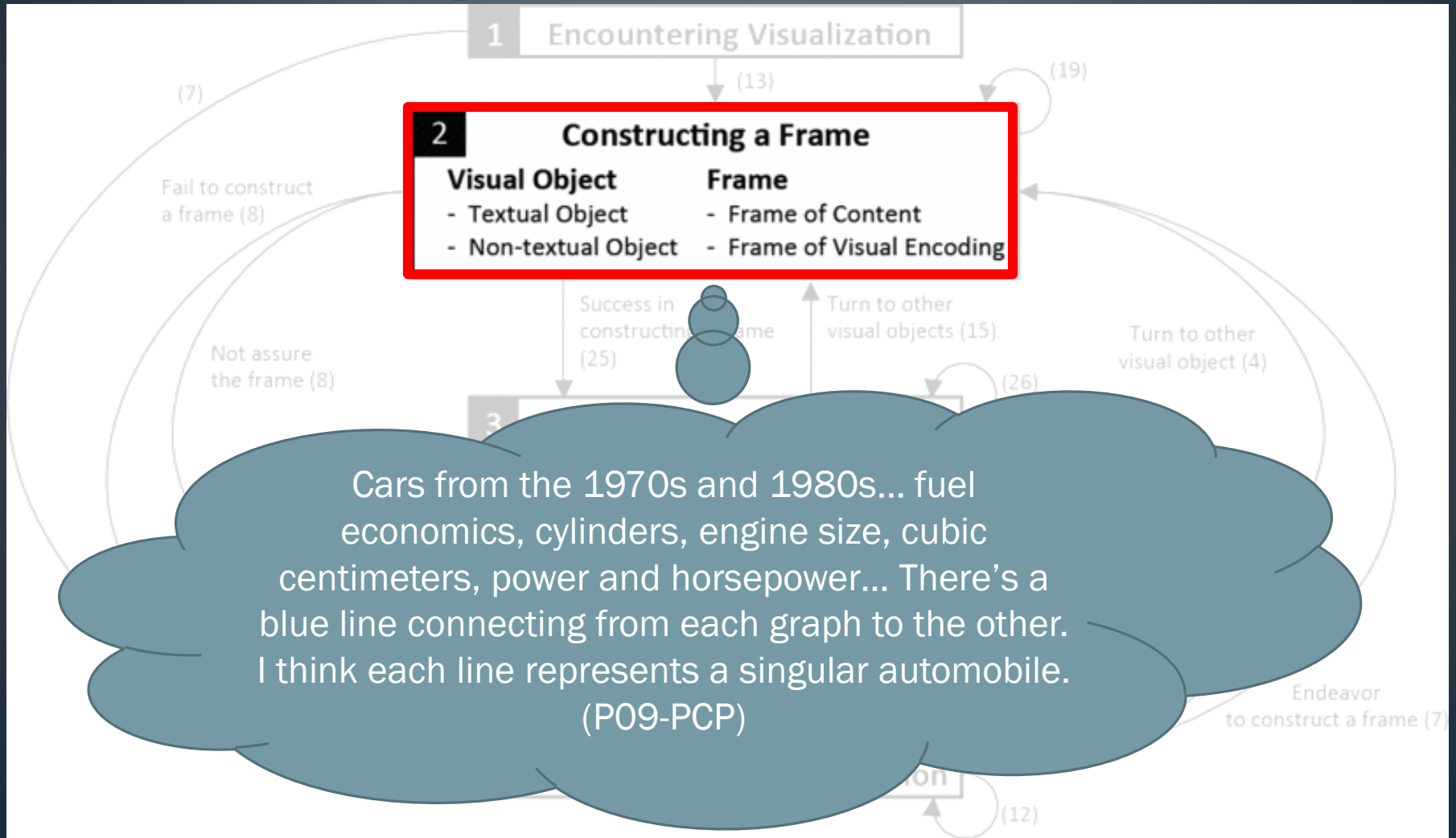
A really crazy chart!  
(P02-CD)

Oh, my goodness, so many blue lines, and they overlap so much.  
(P07-PCP)

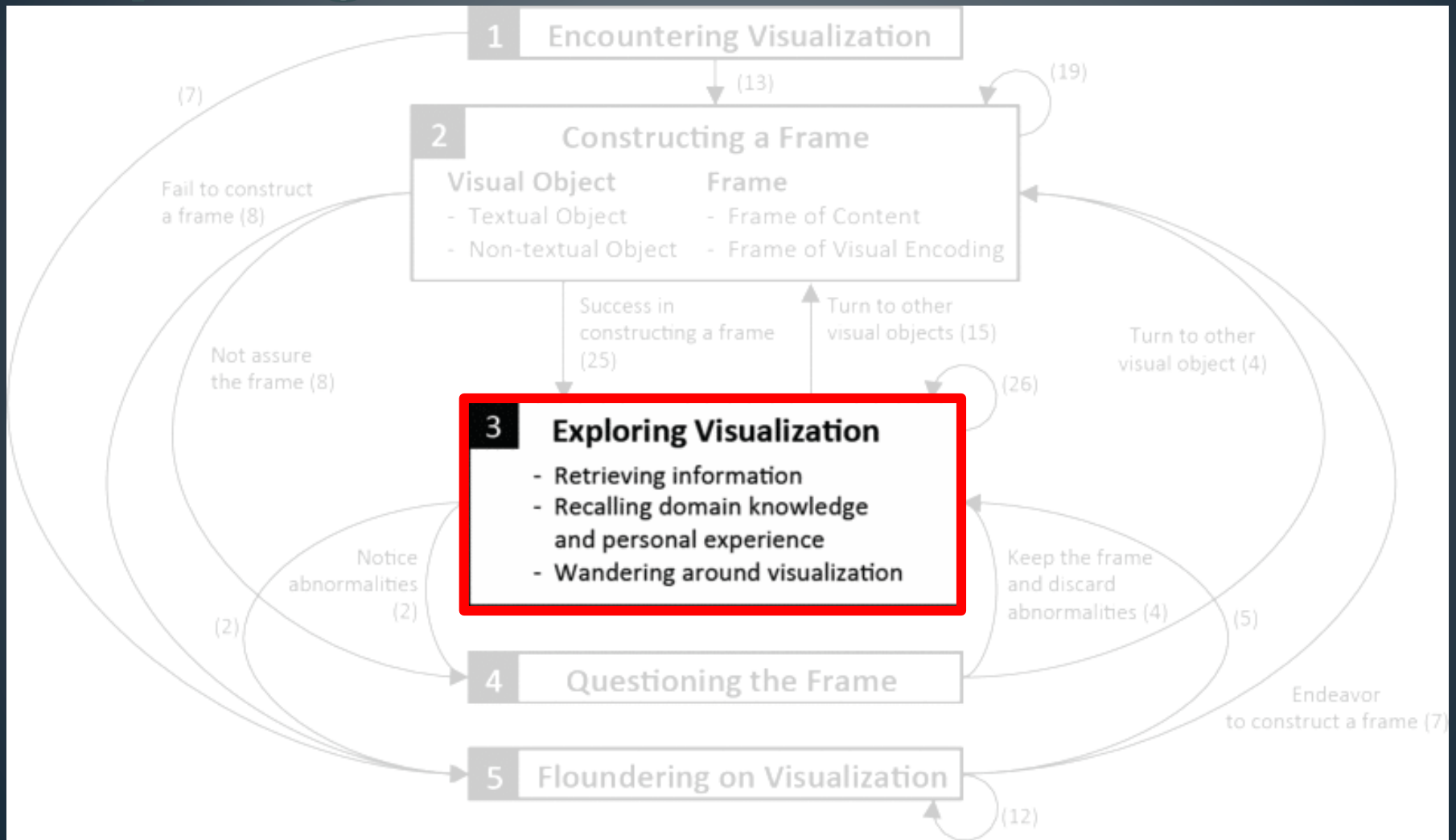
A lot of rectangles and sort of squares.  
(P06-TM)



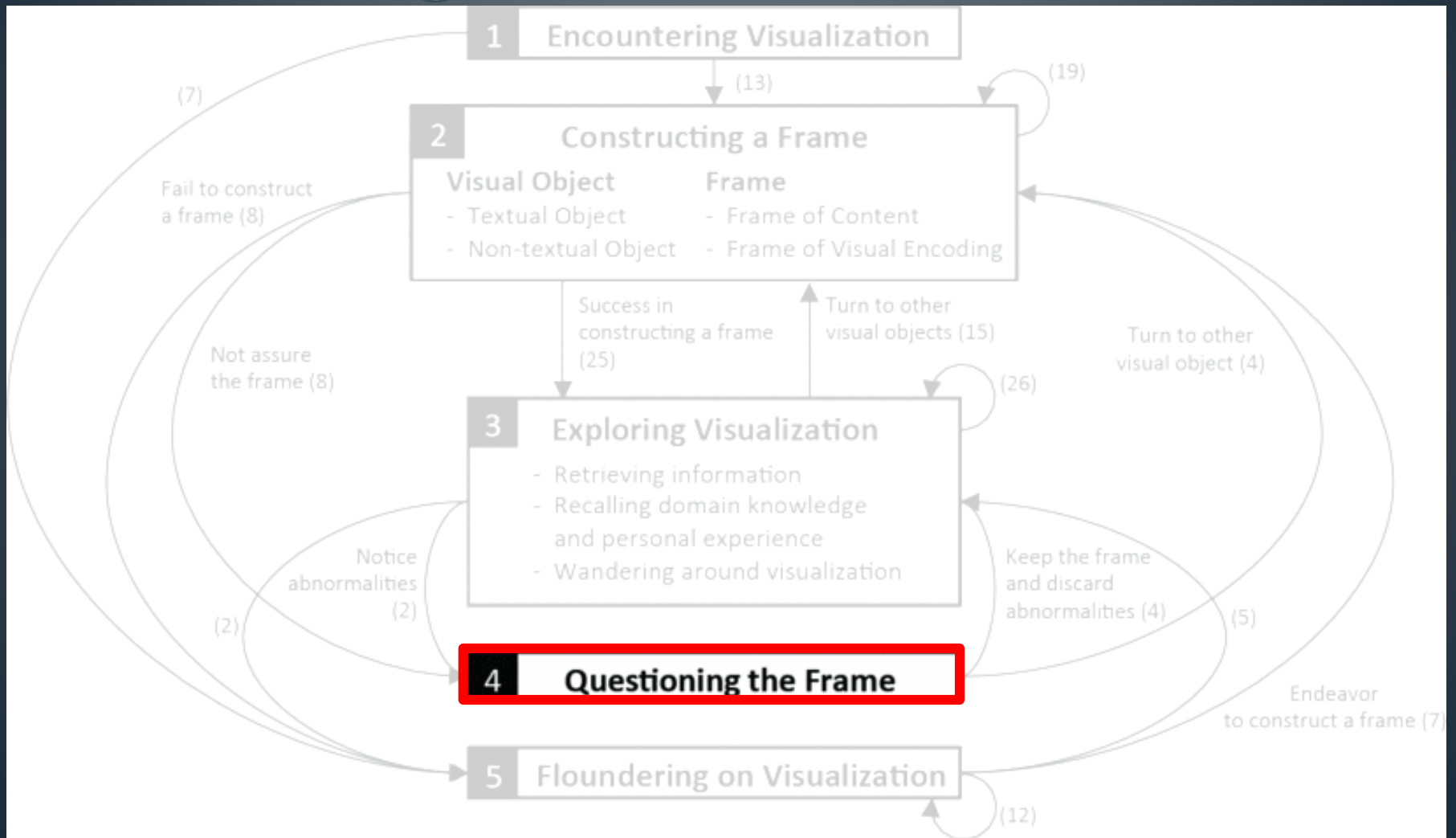
# Constructing the Frame



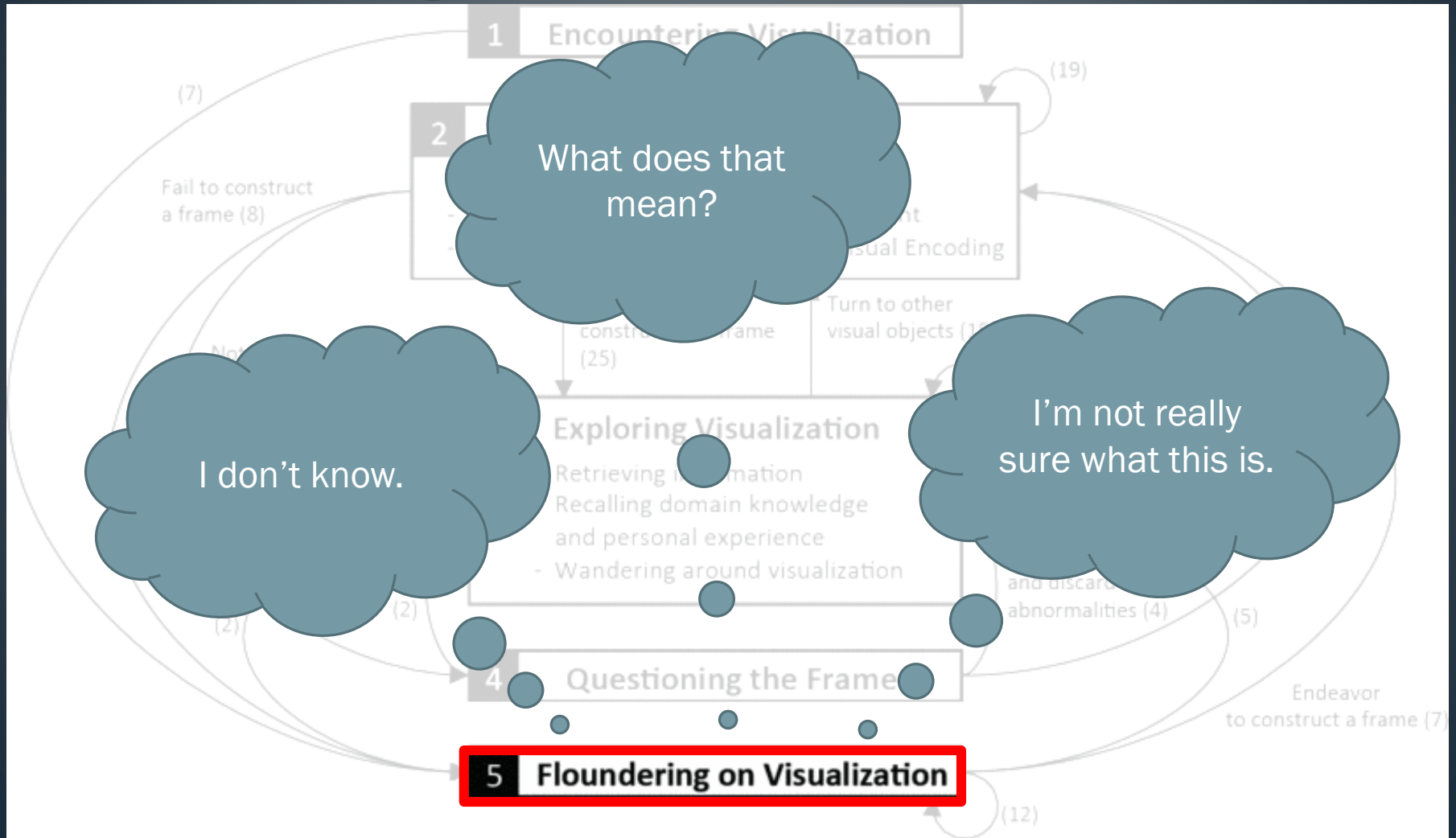
# Exploring the Visualization



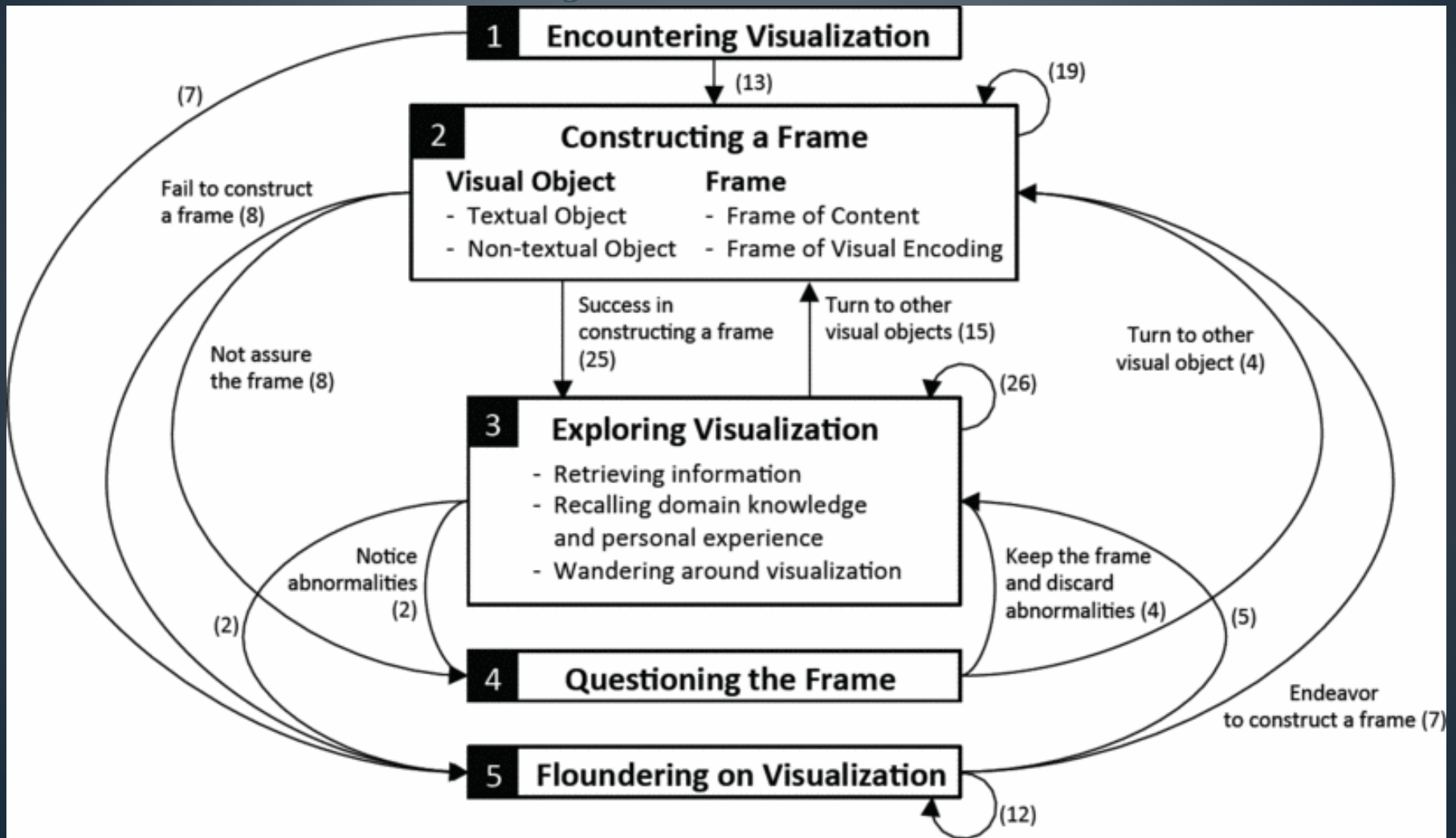
# Questioning the Frame



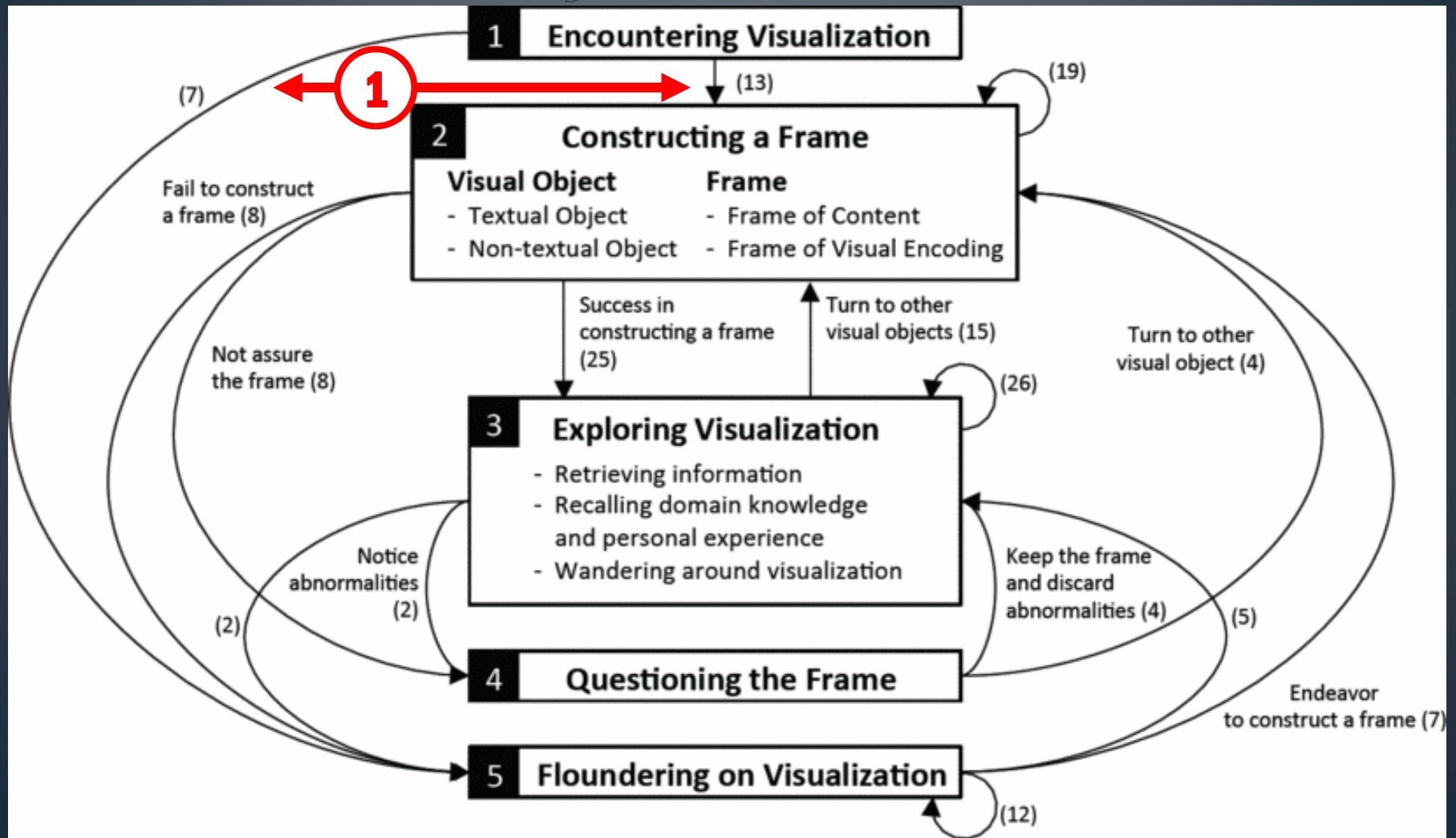
# Floundering in the Visualization



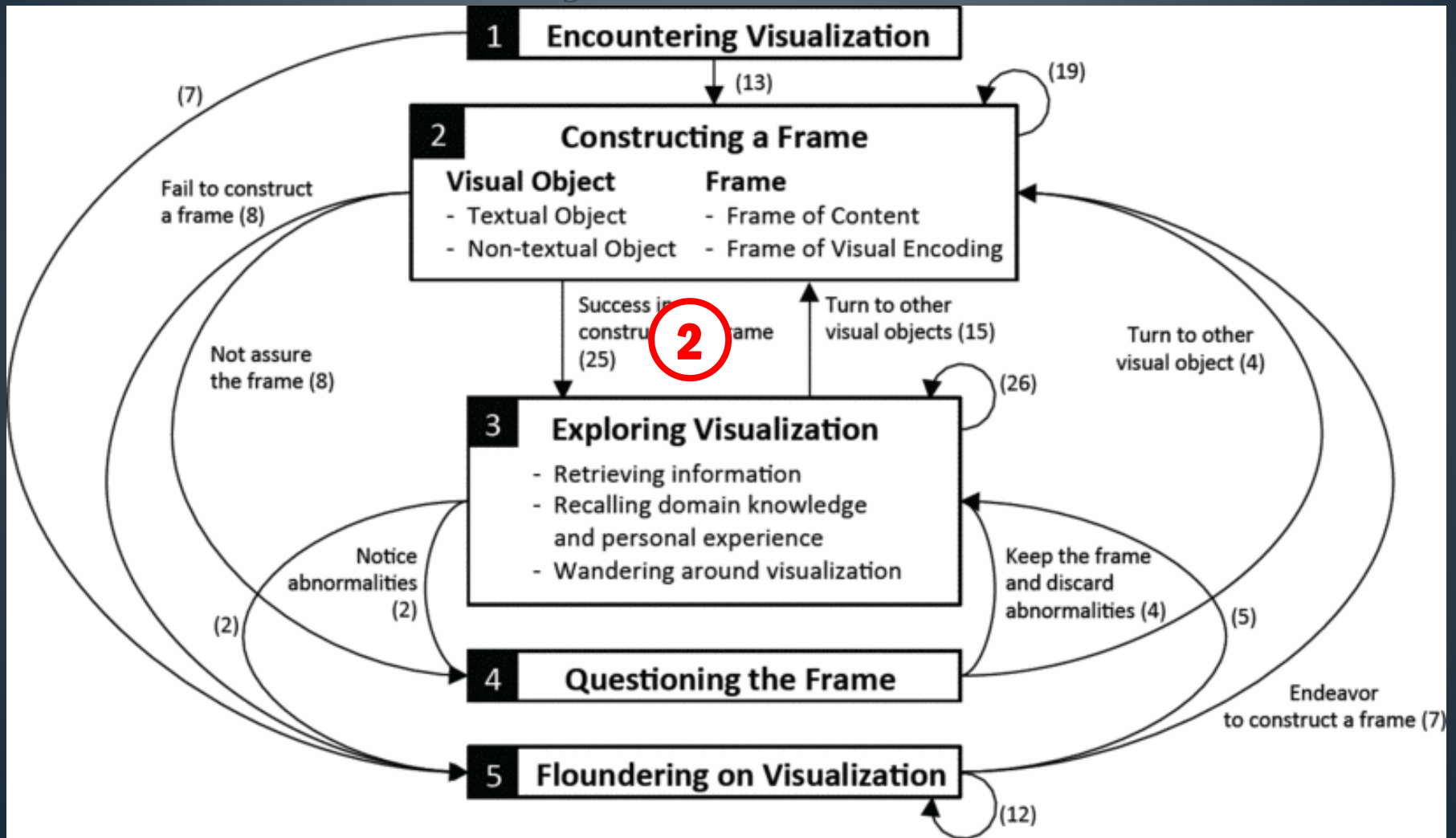
# NOVIS Model Dynamics



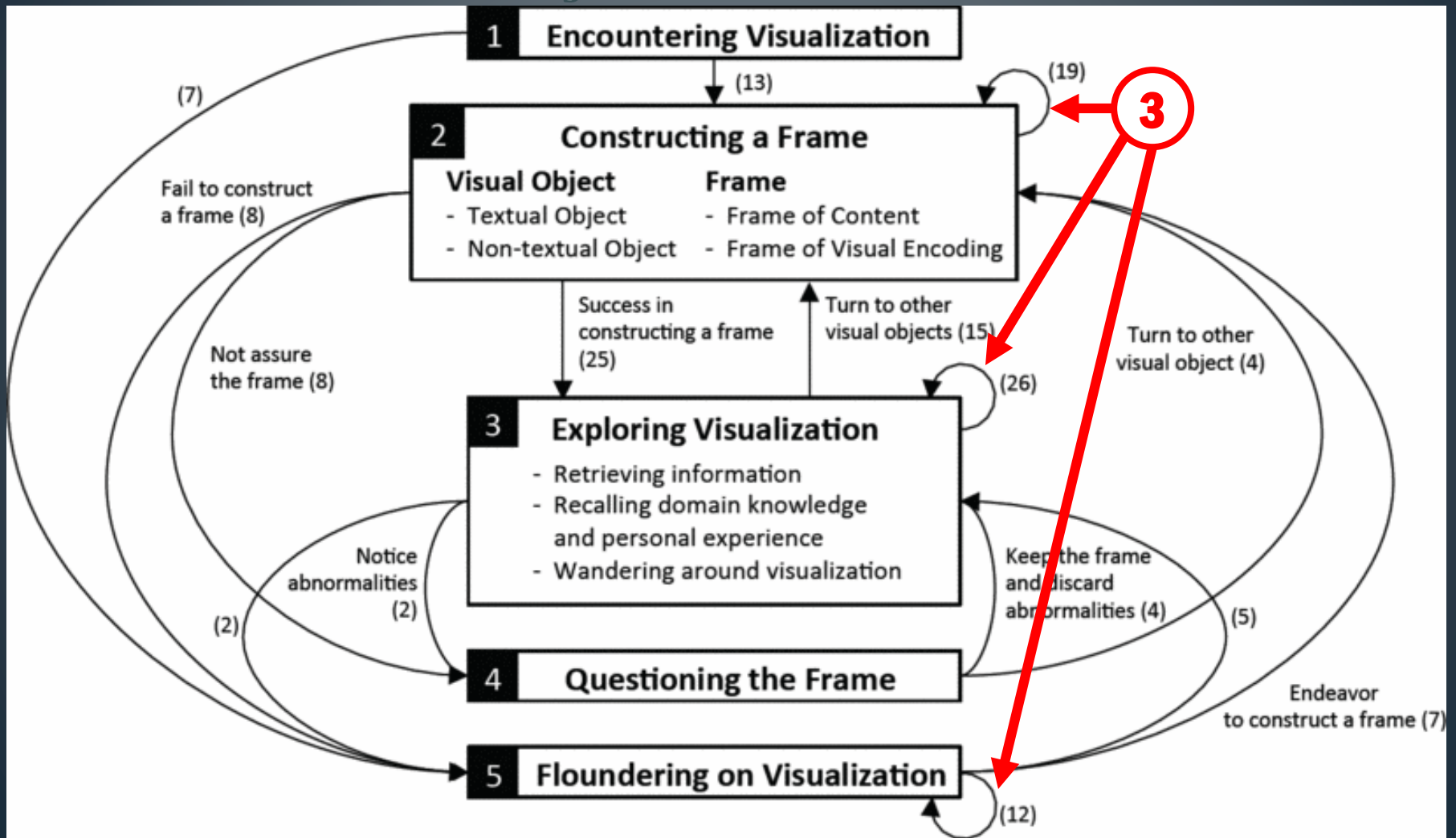
# NOVIS Model Dynamics



# NOVIS Model Dynamics



# NOVIS Model Dynamics





# Findings (Frame)

- Once a frame is constructed, the user tends not to discard it to reconstruct alternatives
  - Generally only iterative modifications of incorrect frames
  - → Overview first with enough visual cues to construct the correct frame

# Findings (Overcoming Floundering)

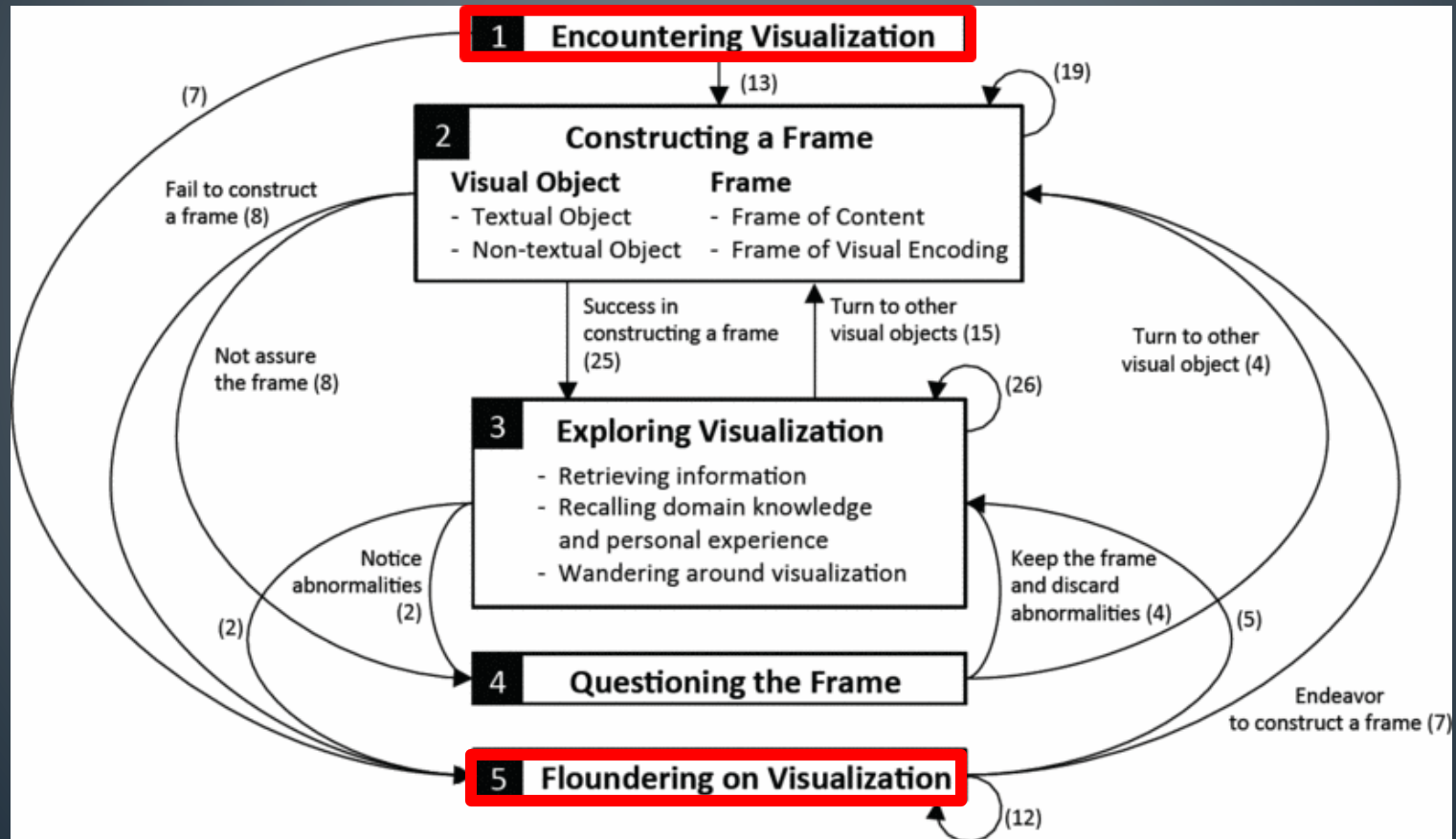
- People modify/reconstruct valid frames by:
  - Focusing on parts related to their domain knowledge
    - → Know the audience
  - Relying on textual objects
    - → Embedding useful text info
  - Making comparisons of changes in visual objects
    - → Designing changes in content appropriately reflected in changes in visualizations

# Critiques/Comments

- Generally sensible model of cognitive process analysis

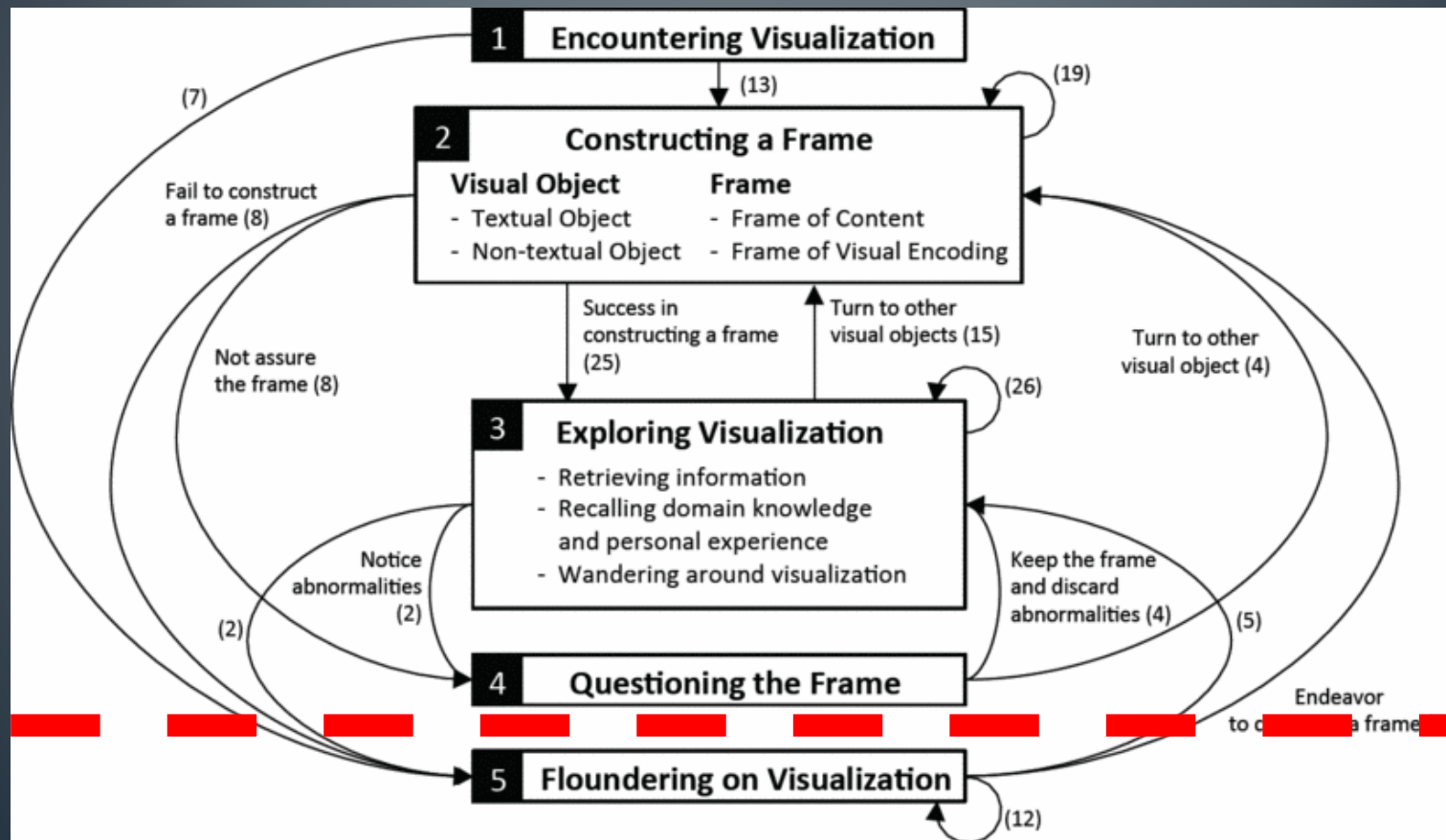
# Critiques/Comments

- Questionable characterization of states as activities



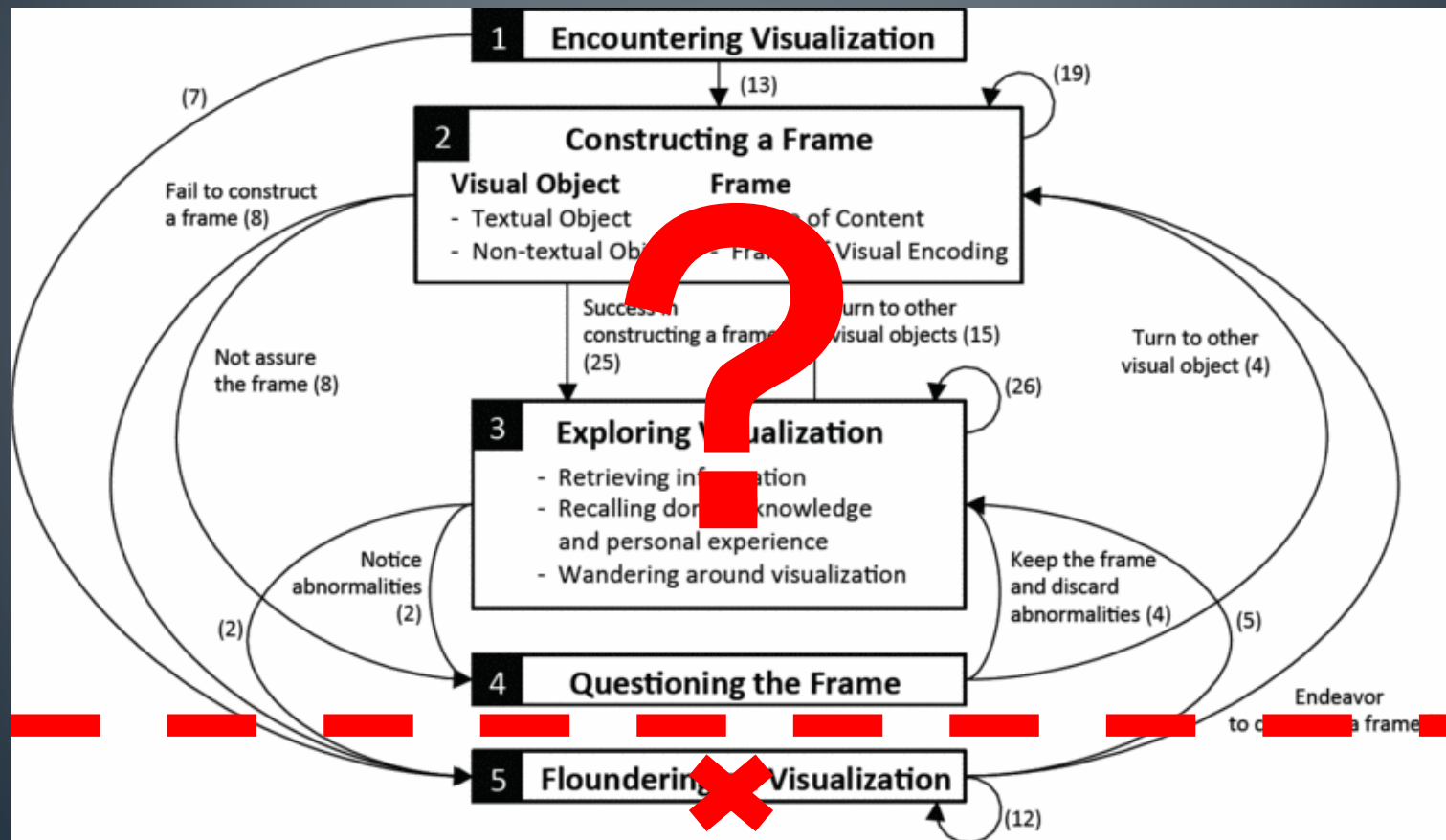
# Critiques/Comments

- No clear answer of sensemaking



# Critiques/Comments

- No clear answer of sensemaking



# Critiques/Comments

- Making sense of sensemaking is tricky!
  - Further validation of NOVIS needed
  - Basis of future research

# Questions/Comments?