

How do people make sense of unfamiliar visualizations?

A Grounded Model of Novice's Information Visualization Sensemaking

CPSC 547 Paper Presentation
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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
 - Sukwon 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



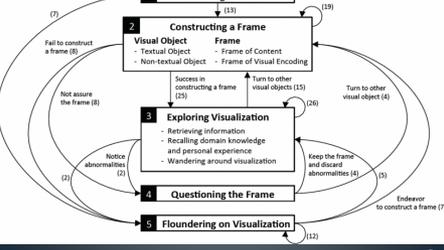
Participants

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

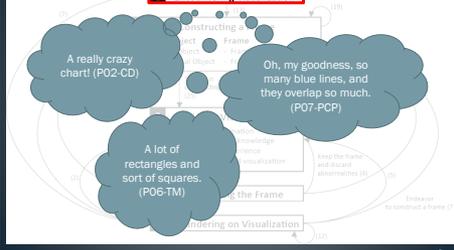
Data Analysis

- 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 - NOVICE's information Visualization Sensemaking

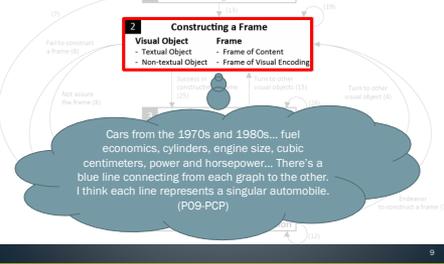
NOVIS Model



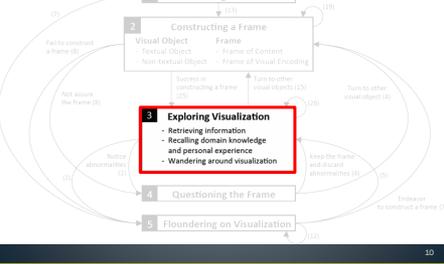
Encountering the Visualization



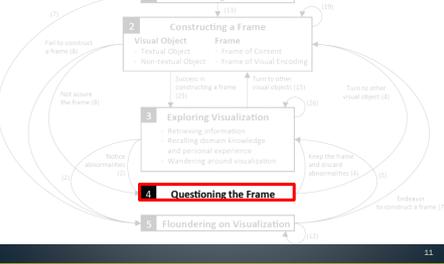
Constructing the Frame



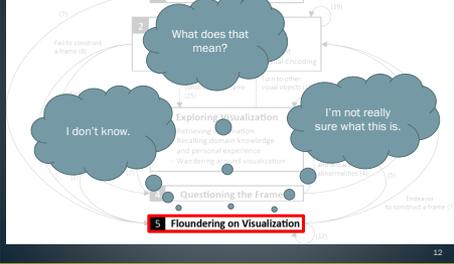
Exploring the Visualization



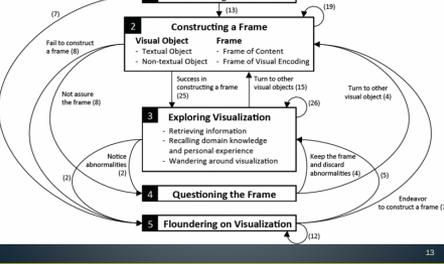
Questioning the Frame



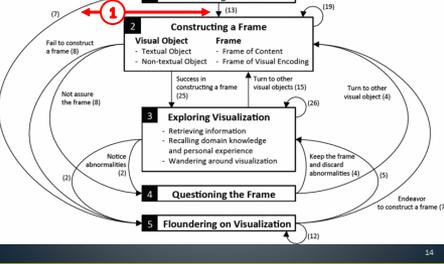
Floundering in the Visualization



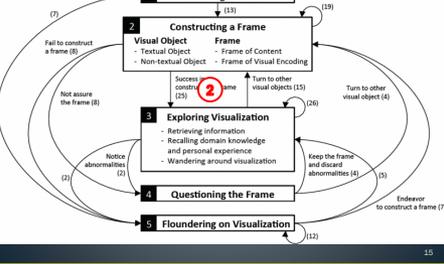
NOVIS Model Dynamics



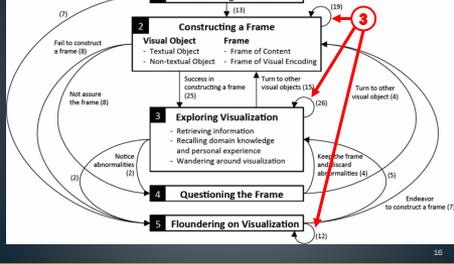
NOVIS Model Dynamics



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

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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

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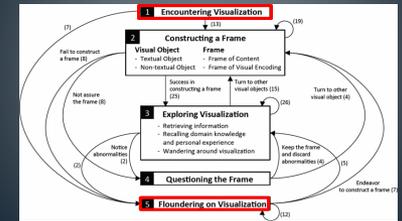
Critiques/Comments

- Generally sensible model of cognitive process analysis

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Critiques/Comments

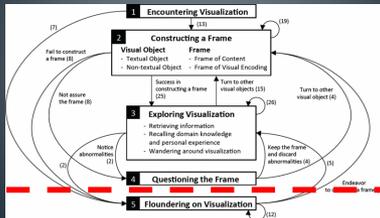
- Questionable characterization of states as activities



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Critiques/Comments

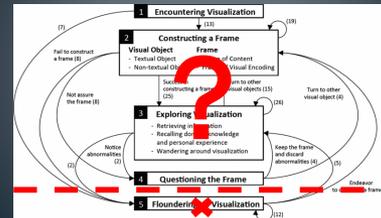
- No clear answer of sensemaking



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Critiques/Comments

- No clear answer of sensemaking



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Critiques/Comments

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

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Questions/Comments?

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