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Can code review be modeled as a cognitive decision-making process?

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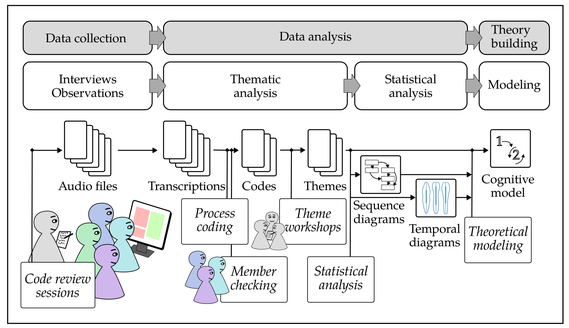
Method

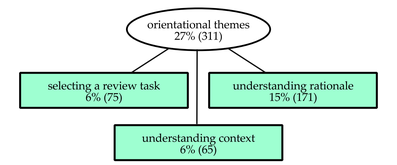
Ethnographic study
Study and record code reviews as part of a team. Interviews with team members.

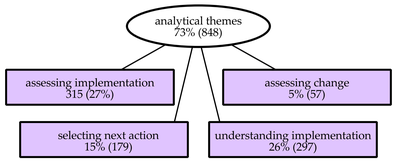
Number of Participants: 10

Number of Code Reviews: 34

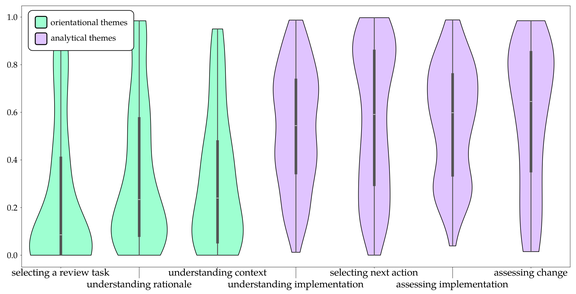


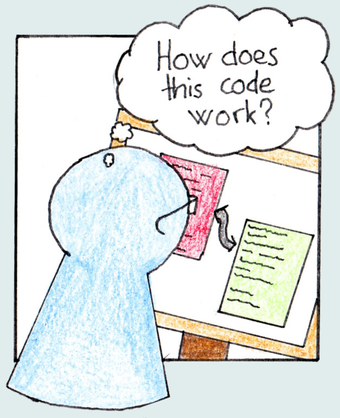
Thematic Analysis





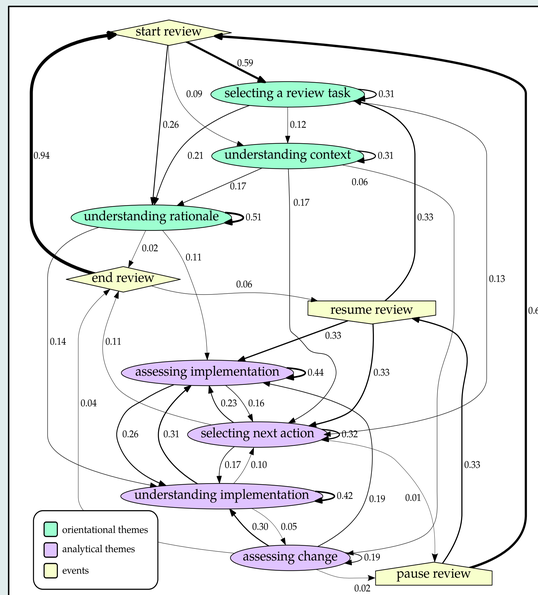
Temporal Analysis





Can **Code Review** be Modeled as a **Cognitive Decision-Making Process?**

(*Spoiler: Yes!*)

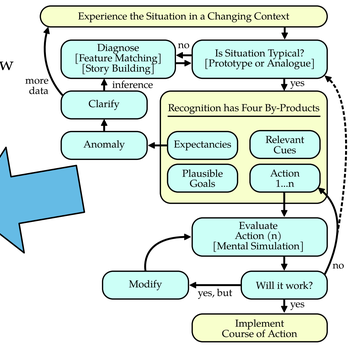


Thematic and sequential analysis **shows two distinct phases**. Orientational and analytical themes occur only in first and second half of the review respectively:

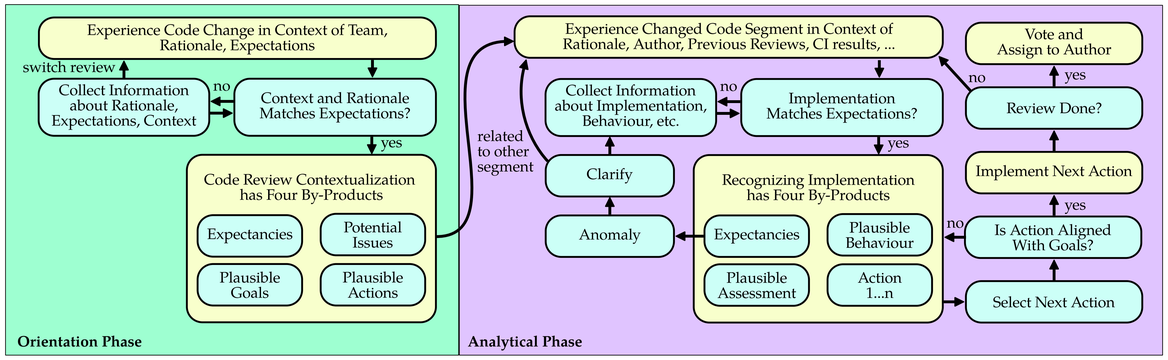
Orientation phase: Establish context and rationale. Linear.
Analytical phase: Understand, assess, plan, act. Iterative.

These phases can be mapped onto Klein's Recognition-Primed Decision-Making (RPD) model [1].

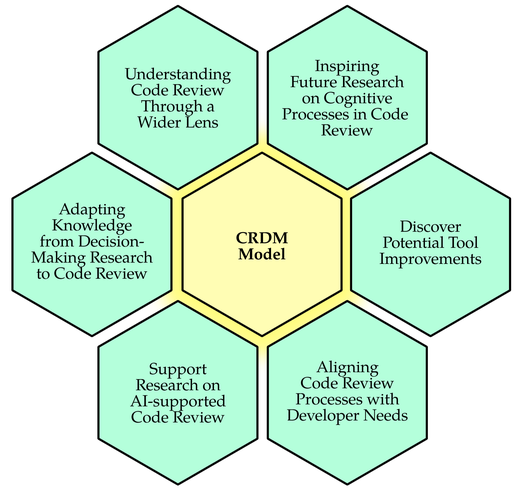
[1] G. Klein, "Sources of Power : How People Make Decisions", 1998.



Leading to the 2-phase cognitive model for **Code Review as Decision-Making (CRDM)**



How is it useful?



Future Work

- Implement and validate AI-supported code review tools using the CRDM model together with participatory design.

- Analyze collected interview and observation data to uncover patterns in actions and strategies used during code review.

- Validate the CRDM model on a larger set of practitioners.

- Adapt research results and tools from integrated decision-making support systems to code review.

Lo Gullstrand Heander, Emma Söderberg, Christofer Rydenfält,
"Code Review as Decision-Making - Building a Cognitive Model from the Questions Asked During Code Review"
Submitted to Empirical Software Engineering, Springer Science, 2025.

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Read the full paper!