

Bachelor's/Master's Thesis: Understanding Decision-Making with LLM-Based Data Assistants: A Mental Model Perspective

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Start date: as soon as possible

Motivation and Goals

Despite the growing capabilities of large language models (LLMs) such as GPT-5, Gemini, or Claude, using their outputs for data-driven decision-making can be challenging. LLM-Based Data Assistants can help users access, analyse, and interpret data. However, users still need to evaluate the generated information and decide how to incorporate it into their judgments. These activities are shaped by users' mental models, meaning their understanding of how the assistant works, what it can do, and where its limitations lie. Inaccurate mental models may lead users to misinterpret outputs or overlook potential errors.

The goal of this thesis is to investigate how users' mental models of LLM-Based Data Assistants shape their decision-making during AI-assisted data analysis. An existing prototype will be provided. Participants will complete selected data-analysis and decision-making tasks while thinking aloud, followed by semi-structured interviews. The study should identify recurring ways in which users interpret, evaluate, and use the assistant's outputs and derive recommendations for supporting informed decision-making.

Required Skills

- Strong interest in (generative) AI and LLMs
- Good English language skills
- Preferably, experience in conducting qualitative research (e.g., interviews)

Starting Literature (Topic)

- Norman, D. A. (1983). Some observations on mental models. In D. Genrner & A. Stevens (Eds.), *Mental Models*. Erlbaum.
- Johnson-Laird, P. N. (1983). *Mental models: Towards a cognitive science of language, inference and consciousness*. Harvard University Press.
- Jussupow, E., Spohrer, K., Heinzl, A., & Gawlitza, J. (2021). Augmenting medical diagnosis decisions? An investigation into physicians' decision-making process with artificial intelligence. *Information Systems Research*, 32(3), 713–735.
- Sîrbu, A.-M., Schelhorn, T. C., Gnewuch, U. (2025) "Explanation Provision Strategies in LLM-based Data Assistants: Impact on Extraneous Cognitive Load, Trust, and Task Performance," in Proceedings of the 33rd European Conference on Information Systems (ECIS 2025).

Starting Literature (Method)

- Charters, E. (2003). The use of think-aloud methods in qualitative research an introduction to think-aloud methods. *Brock Education Journal*, 12(2).
- Ericsson, K. A., & Simon, H. A. (1980). Verbal reports as data. *Psychological Review*, 87(3), 215.
- Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and Organization*, 17(1), 2–26.