UNIVERSITY OF MANNHEIM
Business School

LLM-based Agents to Support Scientific Writing and Communication

Team Project Fall 2025

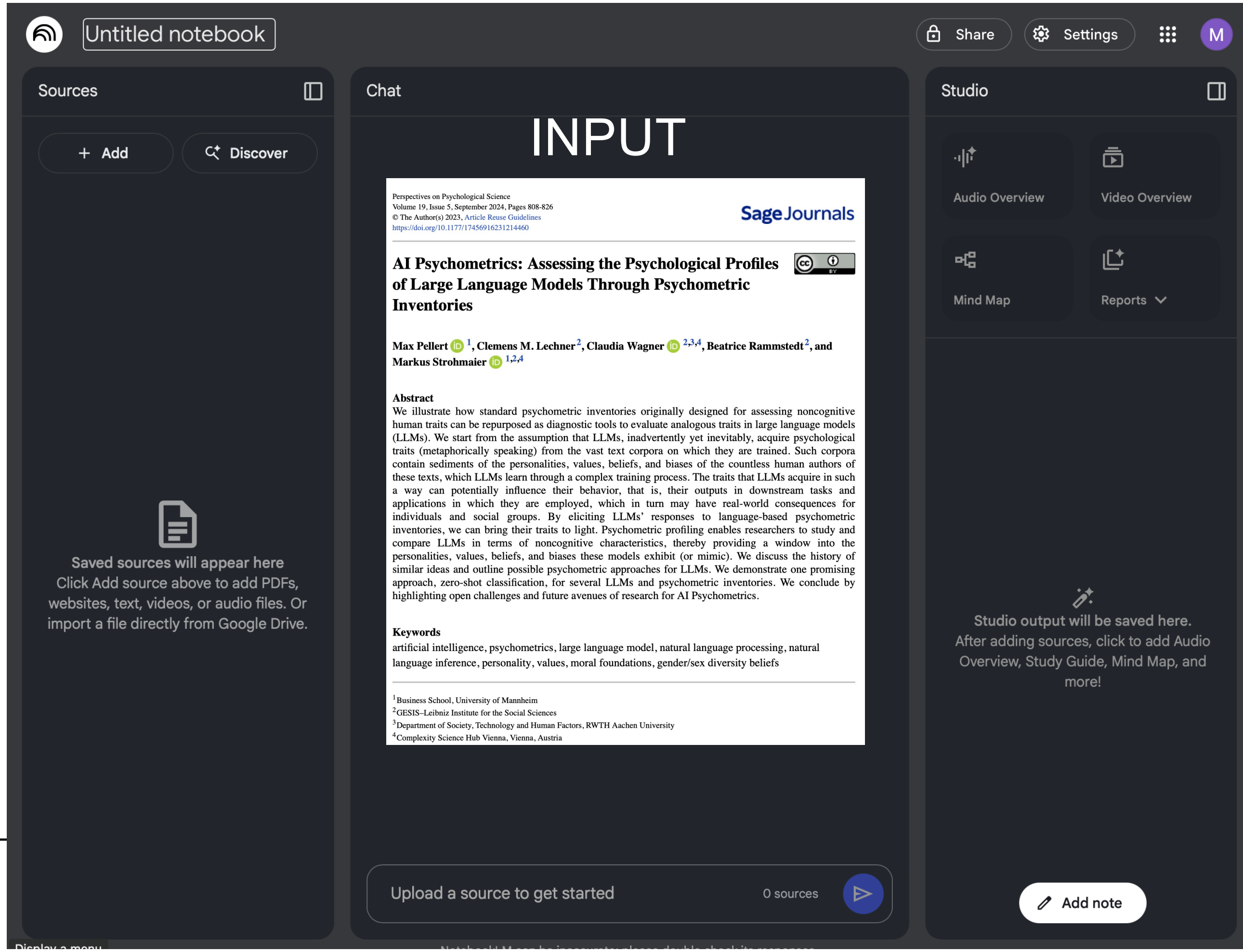
Chair of Data Science in the Economic and Social Sciences

Supervisors: Markus Strohmaier

NotebookLM support for scientific writing and communication

Support for Writing

- Generate constructive reviews and criticisms
- Identify unique contributions
- Sketch future research trajectories
- …



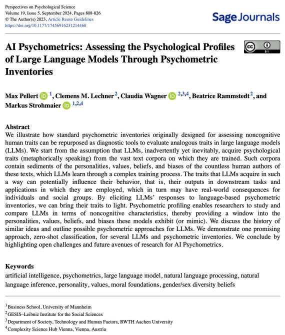
Support for Communication

- Create pedagogical interactive games
- Create press releases for various venues
- Create explanations for students of varying ages
- Create visual mind maps
- Create pedagogical images
- Create a podcast
- Create FAQs
- …

Web app Development: PaperLM

Build a web-based app prototype

- That takes a single scientific paper as an **input**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Sage Journals

AI Psychometrics: Assessing the Psychological Profiles of Large Language Models Through Psychometric Inventories

Max Pellert [1], Clemens M. Lechner [2], Claudia Wagner [2,3,4], Beatrice Rammstedt [2], and Markus Strohmaier [1,2,4]

Abstract
We illustrate how standard psychometric inventories originally designed for assessing noncognitive human traits can be repurposed as diagnostic tools to evaluate analogous traits in large language models (LLMs). We start from the assumption that LLMs, inadvertently yet inevitably, acquire psychological traits (metaphorically speaking) from the vast text corpora on which they are trained. Such corpora contain sediments of the personalities, values, beliefs, and biases of the countless human authors of these texts, which LLMs learn through a complex training process. The traits that LLMs acquire in such a way can potentially influence their behavior, that is, their outputs in downstream tasks and applications in which they are employed, which in turn may have real-world consequences for individuals and social groups. By eliciting LLMs' responses to language-based psychometric inventories, we can bring their traits to light. Psychometric profiling enables researchers to study and compare LLMs in terms of noncognitive characteristics, thereby providing a window into the personalities, values, beliefs, and biases these models exhibit (or mimic). We discuss the history of similar ideas and outline possible psychometric approaches for LLMs. We demonstrate one promising approach, zero-shot classification, for several LLMs and psychometric inventories. We conclude by highlighting open challenges and future avenues of research for AI Psychometrics.

Keywords
artificial intelligence, psychometrics, large language model, natural language processing, natural language inference, personality, values, moral foundations, gender/sex diversity beliefs

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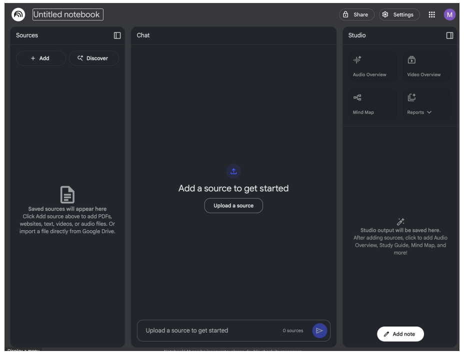
[4] Complexity Science Hub Vienna, Vienna, Austria

- produces paper-specific content as an **output**
  - **Writing Support**: Generate helpful text to increase the quality of writing
  - **Communication Support**: Generate content to facilitate science communication



Case Study: ACL Proceedings

For the ACL 2025 proceedings (https://2025.aclweb.org/program/main_papers/)

- Generate a paper-specific website for all proceedings papers (alternative: a sample)
- Per website, generate content to support scientific Writing and Communication for each paper
- Identify evaluation measures
- Evaluate the outcome
  - Using human subjects
  - Using other LLMs

LLM-based Agents to Support Scientific Writing and Communication

Brief Logistics

- Language: English
- Duration: 6 months
- Number of participants: 4
- Prerequisites: **Strong** Python/programming skills and WebApp dev skills, knowledge in LLMs, NLP, text analytics, Software engineering / Webbased prototype development and LLM integration
- Work process:
  - Lots of coding, experiments, prototype development
  - Regular meetings with supervisors, present and discuss your progress
  - Present your research proposal, intermediate and final results in corresponding presentation meetings
  - Written reports to be submitted at the end
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