University of Ss. Cyril and Methodius in Trnava
Faculty of Mass Media Communication
Námestie Jozefa Herdu 2

ETHICAL EVALUATION

OF RESEARCH INQUIRY TO BE CONDUCTED BY PETER MURÁR

Evaluation took place on: June 16, 2025, Trnava, Slovakia
Evaluation number: 2025/FMK-UCM/09

Present members of the Ethical Committee for Science and Research
at the Faculty of Mass Media Communication
at the University of Ss. Cyril and Methodius in Trnava, Slovakia:

Assoc. Prof. PhDr. Jana Radošinská, PhD. – Head of the Committee
Prof. PhDr. Hana Pravdová, PhD.
Prof. Mgr. Norbert Vrabec, PhD.
Assoc. Prof. PhDr. Jana Galera Matúšová, PhD.
Assoc. Prof. JUDr. PhDr. Martin Solík, PhD.

Preliminary title of the evaluated research:
COMPARISON OF SOURCES IN LARGE LANGUAGE MODELS AND SEARCH ENGINES
The research will be conducted as part of the VEGA project No. 1/0334/24.

Researcher:
PhDr. Peter Murár, PhD.
Associate Professor, study program Marketing Communication
FMK UCM in Trnava

1. Research description

- The study will examine the overlap and structure of sources cited by large language models and returned by search engines. It will compare source selection according to query intent and form and assess its stability over time. The findings will be presented in two research articles, including an analysis of Google AI Overviews and the relationship between domain authority and citation by LLMs.
- The research sample will consist of 200 English-language queries classified by intent, topic, and form (keyword expression or natural-language question). The systems selected for comparison are ChatGPT, Gemini, and Perplexity, alongside Google and Bing.
- The data collection schedule comprises three waves: November 2025, January 2026, and October 2026. Python scripts developed with AI assistance will retrieve source links and supplementary information through SerpAPI and OpenRouter. The data will be stored in Google Sheets associated with the researcher's private Gmail account.

- Source overlap will be assessed using the Jaccard index. The proposed statistical analyses include Kruskal–Wallis, Mann–Whitney and chi-square tests, subject to the assumptions of each test. Additional analyses will be conducted in JAMOVI. Domains will also be classified into source categories.
- No human participants will be involved, and no personal data will be intentionally collected. The queries will be formulated by the researcher. AI assistance in script development will be transparently disclosed, and calculations will be verified through an independent Python calculation and manual inspection of 10 queries.

2. Ethical aspects of the research

- **Human participants and informed consent:** The research does not involve human participants. The queries are formulated by the researcher; therefore, informed consent and the right to withdraw are not applicable.
- **Data protection and confidentiality:** No personal data will be intentionally collected. The analysis will focus on source links and supplementary information returned by the selected systems. Any incidental personal information will be excluded from published or shared datasets.
- **Data storage and security:** Research data will be stored in Google Sheets associated with the researcher's private Gmail account. Access to the research data will be restricted to the researcher.
- **Responsible data collection:** Data will be collected through authorized API access, respecting the applicable service conditions and access restrictions. Sources used in research publications will be acknowledged appropriately.
- **Use of artificial intelligence and verification:** AI assistance in developing research scripts will be transparently disclosed. Calculations will be verified through an independent Python calculation and manual inspection of 10 queries. The researcher remains responsible for the accuracy of the analysis.
- **Researcher's interpretation:** Findings will be presented accurately and transparently, with due consideration of methodological limitations, changes in system outputs over time and potentially incorrect or unverifiable source links.

Based on the above, it can be stated that the research to be carried out by PhDr. Peter Murár, PhD. complies with the Code of Ethics of the Faculty of Mass Media Communication of the University of Ss. Cyril and Methodius in Trnava. The research process will be further monitored by the Ethical Committee for Science and Research to make sure its outcome and the manner in which it is to be presented are in accordance with the faculty's Code of Ethics.

On behalf of the Ethical Committee for Science and Research at the Faculty of Mass Media Communication at the University of Ss. Cyril and Methodius in Trnava, Slovakia

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