Can LLMs Mimic Human-Like Mental Accounting and Behavioral Biases?

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We examine the economic decision-making and behavioral biases of Large Language Models (LLMs) across English, Chinese, Spanish, and French, with a specific emphasis on mental accounting. We develop a probabilistic graphical model to dissect the influences of reasoning factors on LLMs' decision-making processes.

We investigate three aspects of mental accounting. First, we analyze LLMs' mental arithmetic through the perspective of prospect theory, finding that Spanish and French LLMs exhibit human-like value functions, including loss aversion, whereas English and Chinese LLMs do not. Further, when considering complex outcomes, LLMs do not employ hedonic framing to maximize "psychological pleasure" and minimize "pain" in the same way humans do. This difference may be attributed to LLMs' stronger sensitivity to losses and weaker sensitivity to gains. Second, we evaluate how LLMs handle financial decision-making when consumption occurs concurrently with or separately from transactions. In this setting, all LLMs demonstrate an ability akin to humans to differentiate between immediate and future consumption, illustrating their capacity to perceive transaction utility in a human-like manner. Third, our analysis of mental accounting in a dynamic environment reveals that, unlike humans who typically segregate only gains, LLMs across all languages except English tend to segregate both losses and gains over time. Further investigation into the LLMs' reasoning processes reveals that they may exhibit more rational reasoning than humans.

Methodologically, we develop a framework to understand how various personas across various linguistic contexts affect LLMs' mental accounting and decisions via their reasoning process. This method systematically varies input prompts according to psychological personality traits, cognitive skills, and socio-economic characteristics, and then investigates how these variations influence LLM reasoning and outputs. The graphical model then provides a pathway of how personas influence LLM behaviors through reasoning changes.

Our study demonstrates the practical applications of LLMs in developing hypotheses and generating insights about consumer behaviors that can be affected by mental accounting and behavioral biases. We exemplify this by showcasing the utility of LLMs in a periodic pricing setting.

Our study provides insights into the capabilities and limitations of LLMs in mimicking human-like mental accounting. Beyond serving as a potential tool for "pre-scientific" insights, our findings highlight the divergence between LLMs and humans, urging practitioners and researchers to closely examine how these differences from human norms could impact their applications of LLMs.

For the full paper, please visit: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4705130.

CCS Concepts: • **Information systems** → **Language models**; • **Applied computing** → **Sociology**; **Economics**.

Additional Key Words and Phrases: Generative AI; LLMs; Economic decision-making; Mental accounting; Prospect theory