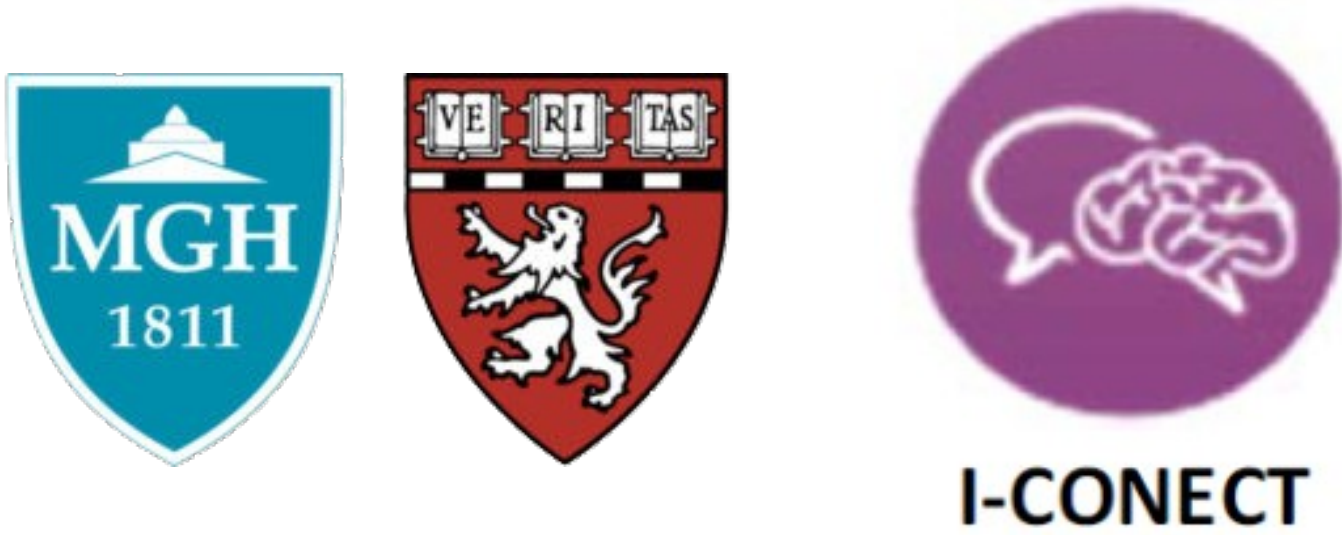


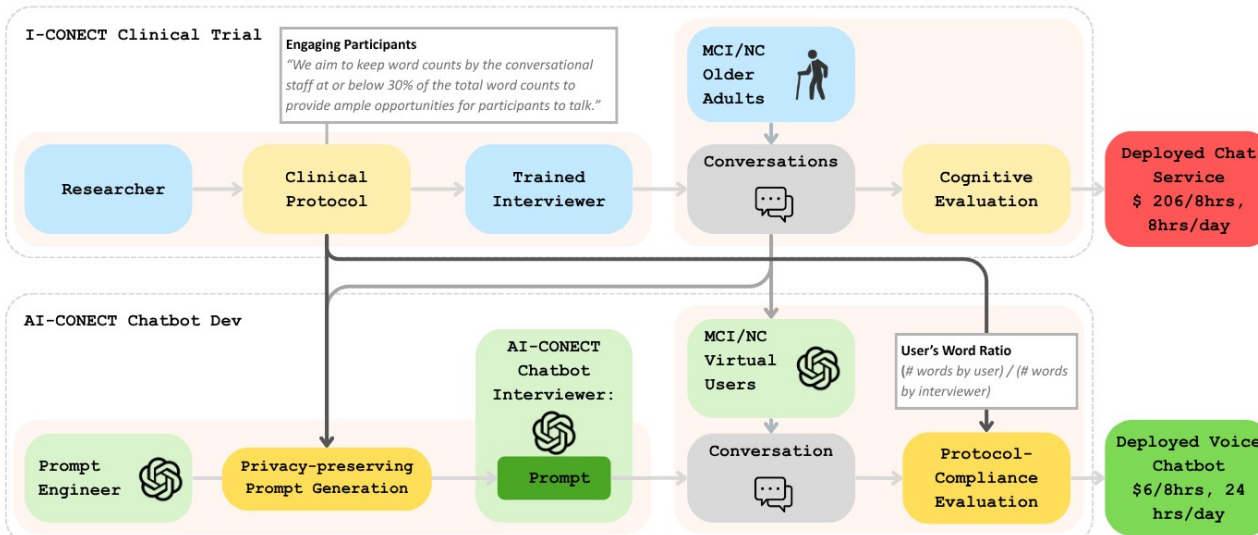
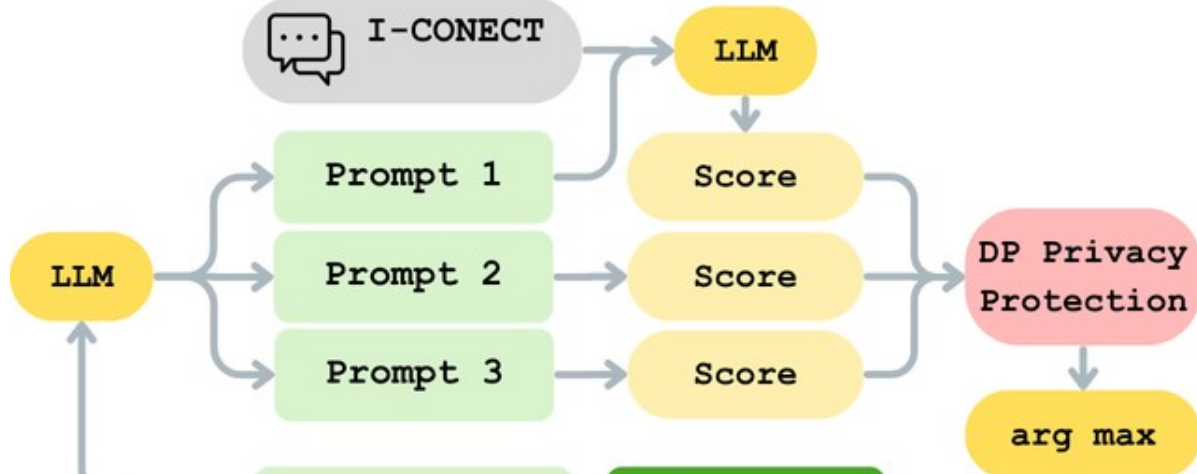
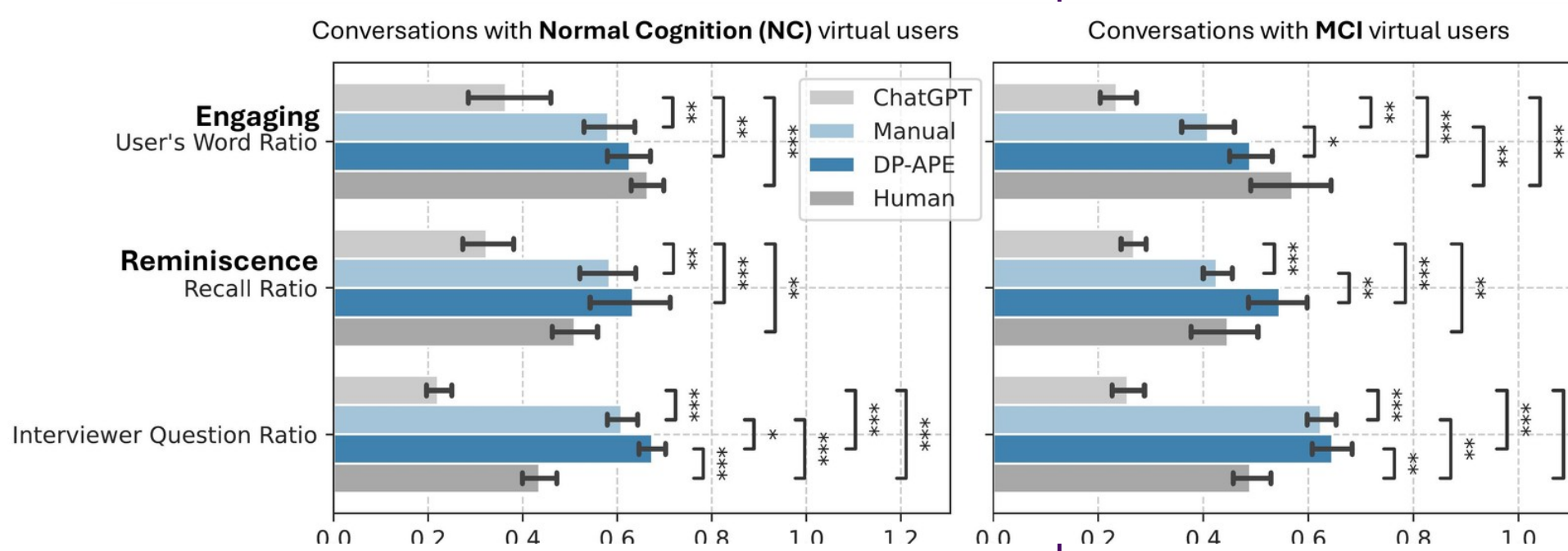
AI-CONNECT: Designing Responsible-AI-based Conversational Chatbots for Dementia Intervention



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Optimized via data-driven automatic prompting on I-CONNECT conversations, AI chatbots match human interviewers in engaging socially isolated older adults with MCI and eliciting reminiscence — a scalable path to conversational interventions for dementia.

INTRODUCTION	METHODS	RESULTS	CONCLUSIONS	REFERENCES																																							
Social isolation is recognized as a major modifiable risk factor for dementia. The Internet-Based Conversational Clinical Trial (I-CONNECT, NCT02871921) demonstrated that semi-structured engaging conversations can effectively reduce social isolation and slow cognitive decline among older adults with mild cognitive impairment (MCI). However, the scalability of this intervention is constrained by the availability and cost of trained human interviewers, limiting its broader dissemination and long-term sustainability.  Study overview: the I-CONNECT trial and AI-CONNECT chatbot development & evaluation.	To address this, we developed the AI-CONNECT chatbot, a Responsible-AI system that implements the I-CONNECT conversational intervention protocol using large language models (LLMs) and optimized prompts, enabling accessible, affordable intervention without the human-resource limitations. We trained the chatbot's prompts on transcribed conversations from the I-CONNECT study via a privacy-preserving learning framework, and evaluated it using “virtual users” (digital twins)—LLM replicas of participants from the I-CONNECT clinical trial. We compared virtual users' engagement with ChatGPT versus the AI-CONNECT chatbot (ChatGPT with trained prompts).  Privacy-preserving prompt optimization on I-CONNECT data.	We simulated conversations between chatbots and virtual users – 9 with MCI and 9 with normal cognition (NC). Each completed 60 conversations (≤40 turns, ~3000–4000 words or 20–30 min) with ChatGPT or the AI-CONNECT chatbot. We find that training prompts on the I-CONNECT conversations significantly improved AI interviewers' ability to engage virtual users, measured by the user's word ratio (% of words provided by the user); a higher ratio implies better engagement. The improvement is significant in both MCI (ChatGPT 0.235; AI-CONNECT 0.489; p=0.0004, Mann–Whitney U) and NC (ChatGPT 0.365; AI-CONNECT 0.626; p=0.002) virtual users—and approaches human interviewers (MCI 0.570; NC 0.665). <table><caption>Engagement metrics by prompting method for NC and MCI virtual users</caption><tr><th>Metric</th><th>Virtual User Type</th><th>ChatGPT</th><th>Manual</th><th>DP-APE</th><th>Human</th></tr><tr><td rowspan="2">User's Word Ratio</td><td>NC</td><td>0.365</td><td>0.235</td><td>0.626</td><td>0.665</td></tr><tr><td>MCI</td><td>0.235</td><td>0.235</td><td>0.489</td><td>0.570</td></tr><tr><td rowspan="2">Reminiscence Recall Ratio</td><td>NC</td><td>0.365</td><td>0.235</td><td>0.626</td><td>0.665</td></tr><tr><td>MCI</td><td>0.235</td><td>0.235</td><td>0.489</td><td>0.570</td></tr><tr><td rowspan="2">Interviewer Question Ratio</td><td>NC</td><td>0.365</td><td>0.235</td><td>0.626</td><td>0.665</td></tr><tr><td>MCI</td><td>0.235</td><td>0.235</td><td>0.489</td><td>0.570</td></tr></table>	Metric	Virtual User Type	ChatGPT	Manual	DP-APE	Human	User's Word Ratio	NC	0.365	0.235	0.626	0.665	MCI	0.235	0.235	0.489	0.570	Reminiscence Recall Ratio	NC	0.365	0.235	0.626	0.665	MCI	0.235	0.235	0.489	0.570	Interviewer Question Ratio	NC	0.365	0.235	0.626	0.665	MCI	0.235	0.235	0.489	0.570	These findings demonstrate that the AI-CONNECT chatbot can engage older adults in cognitively stimulating dialogues in simulated conversations. Our preliminary results demonstrate a pathway for integrating Responsible AI to offer a practical and scalable alternative to human-facilitated I-CONNECT interventions toward delaying cognitive decline.	1. Dodge HH, et al. I-CONNECT RCT among socially isolated adults 75+ with NC or MCI: topline results. The Gerontologist. 2024;64(4):gnad147. 2. Hong, J., Zheng, W., Meng, H., Liang, S., Chen, A., Dodge, H. H., ... & Wang, Z. (2024). A-conect: Designing ai-based conversational chatbot for early dementia intervention. In ICLR 2024 Workshop on Large Language Model (LLM) Agents.. Acknowledgement: NIH R01AG051628, R01AT056102.
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				CONTACT  Junyuan Hong mr.junyuan.hong@gmail.com  ALZHEIMER'S ASSOCIATION  AAIC 26																																							