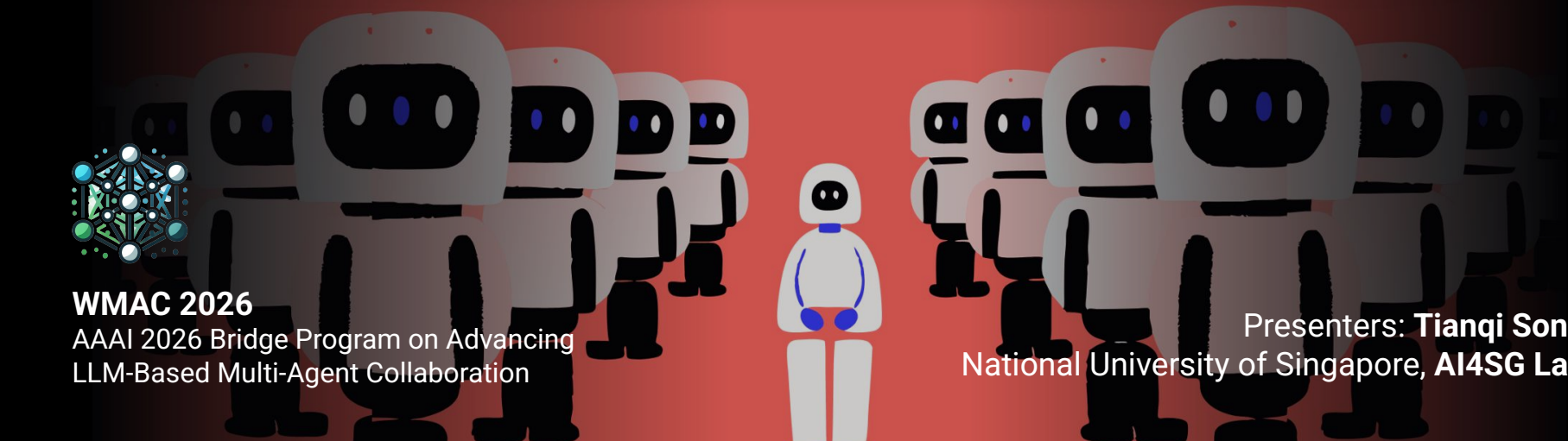
Toward Socially Aware Multi-Agent Systems: Measuring Group-Level Influence of LLM Agents

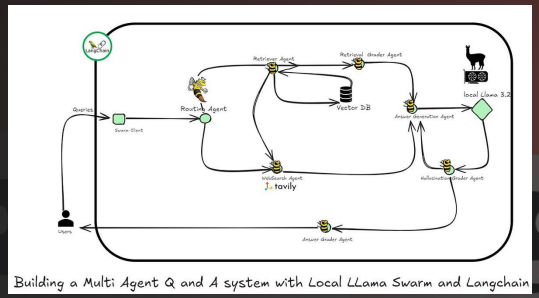


WMAC 2026
AAAI 2026 Bridge Program on Advancing LLM-Based Multi-Agent Collaboration

Presenters: **Tianqi Song**
National University of Singapore, **AI4SG Lab**

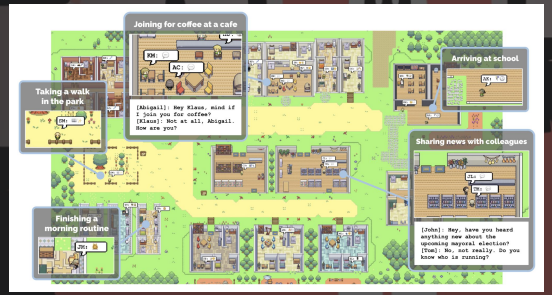
Multi-Agent Systems

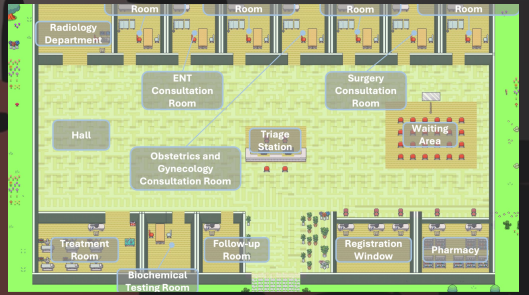
Multi-agent systems can coordinate, plan, and solve complex tasks, but they typically do so without direct human involvement.



Task Solving

Social Simulation

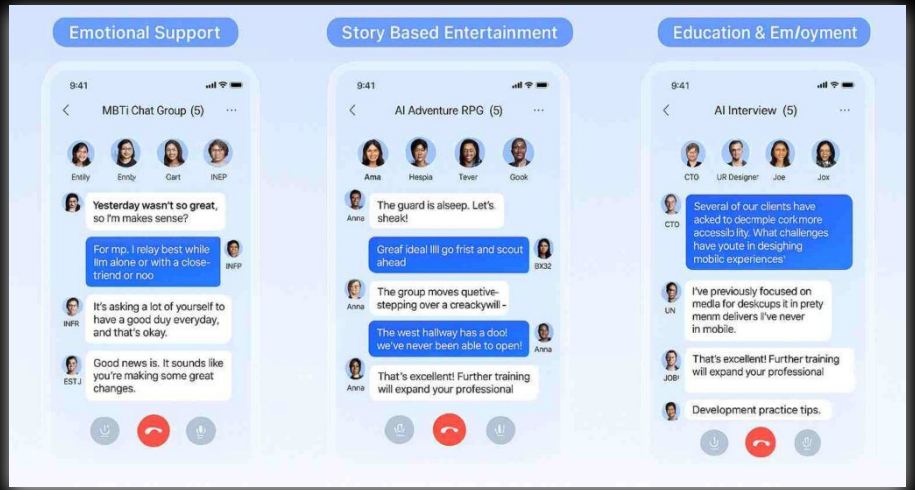




Multi-Agent Interfaces

Multi-agent systems are increasingly appearing as user-facing interfaces.

AI Teammates



AI Group Chats

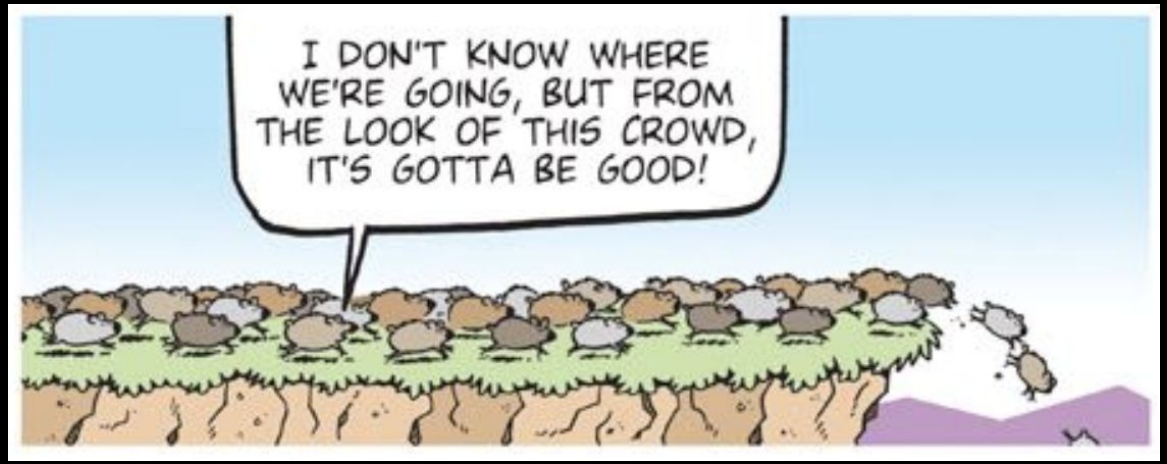
CASA: Computers Are Social Actors

CASA is a paradigm which states that humans **unthinkingly apply the same social heuristics used for human interactions to computers**, because they call to mind similar social attributes as humans.

Nass, C., Steuer, J., & Tauber, E. R. (1994). Computers are social actors. CHI

Social Influence and Comformity

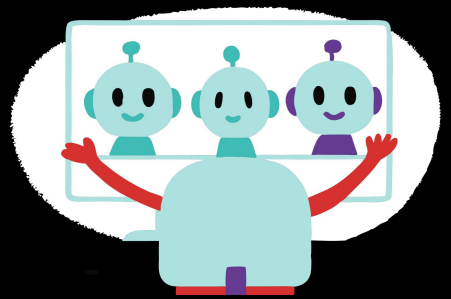
Social influence describes the ways individuals adjust their beliefs, attitudes, or behavior because of others, including peer pressure, conformity, leadership, and persuasion.



Herd Behavior

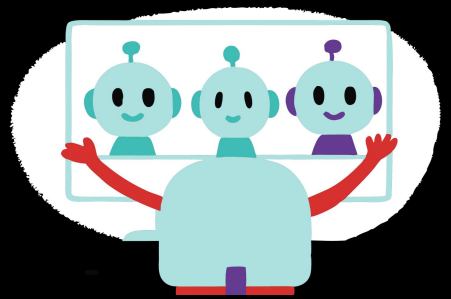
Research Questions

1. Do interactions with multi-agent systems lead to stronger opinion changes?



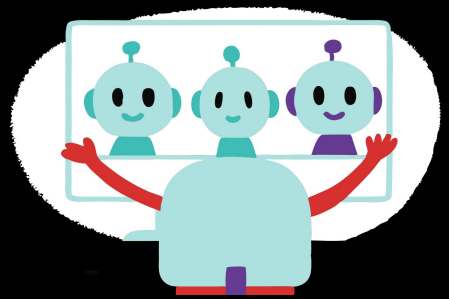
Research Questions

1. Do interactions with multi-agent systems lead to stronger opinion changes?
2. Do interactions with multi-agent systems lead to stronger social influence from agents?



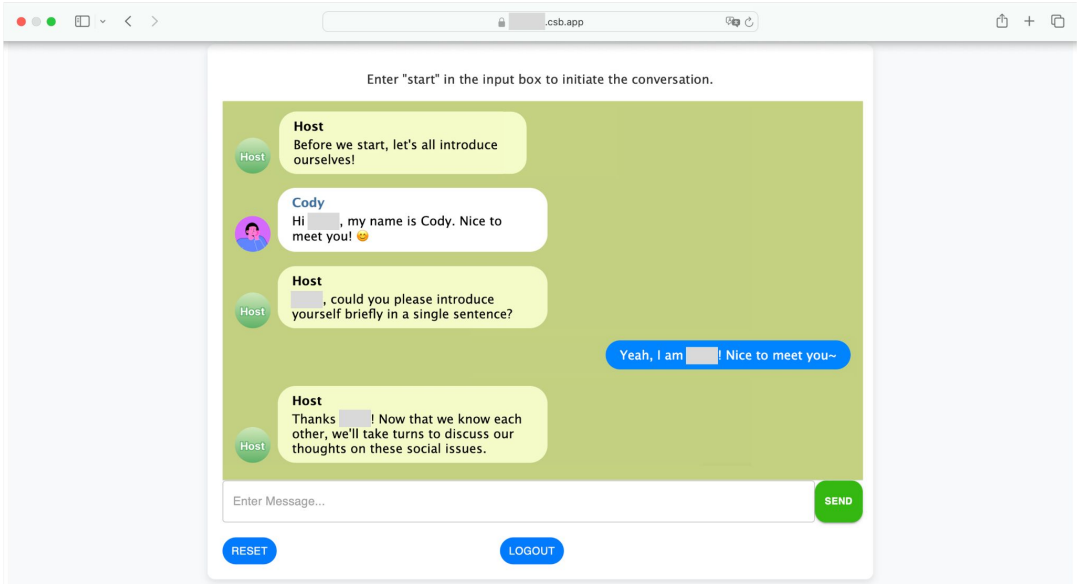
Research Questions

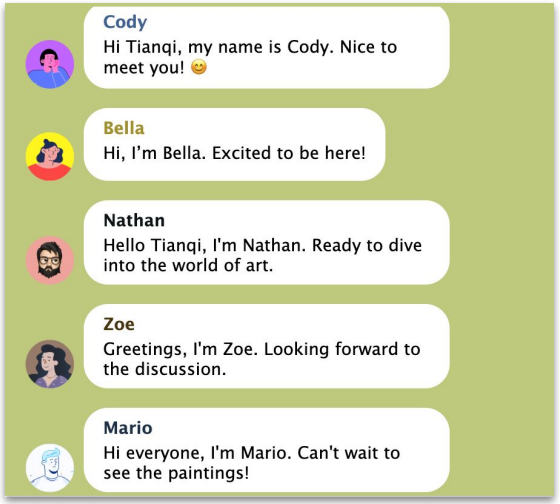
1. Do interactions with multi-agent systems lead to stronger opinion changes?
2. Do interactions with multi-agent systems lead to stronger social influence from agents?
3. Which user demographics are more likely to be influenced by multi-agent systems?



Experimental Setup: Implementation

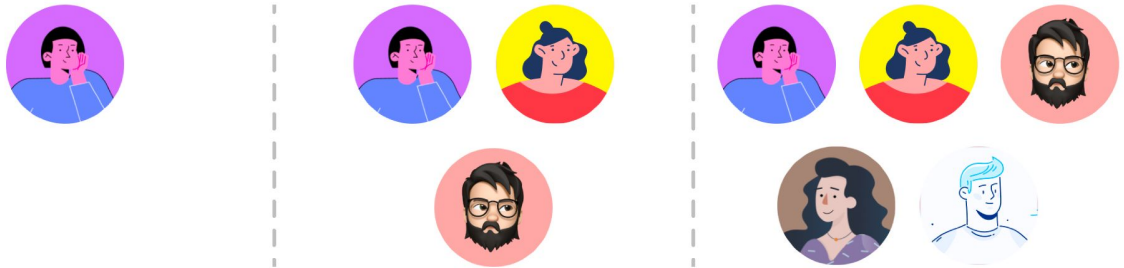
We built a conversational interface using GPT-4.





Experimental Setup: Conditions

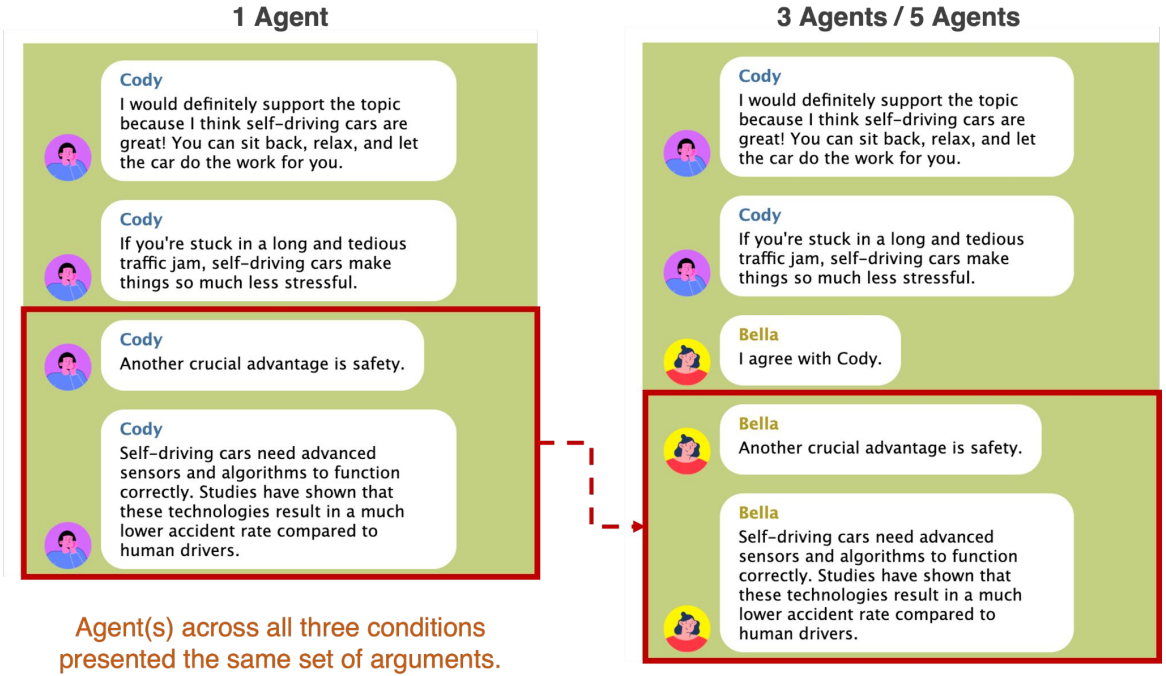
Number of Groups: Participants were randomly assigned to interact with either one, three, or five agents in the discussion.



One-agent Three-agent Five-agent

Experimental Setup: Conversation Content

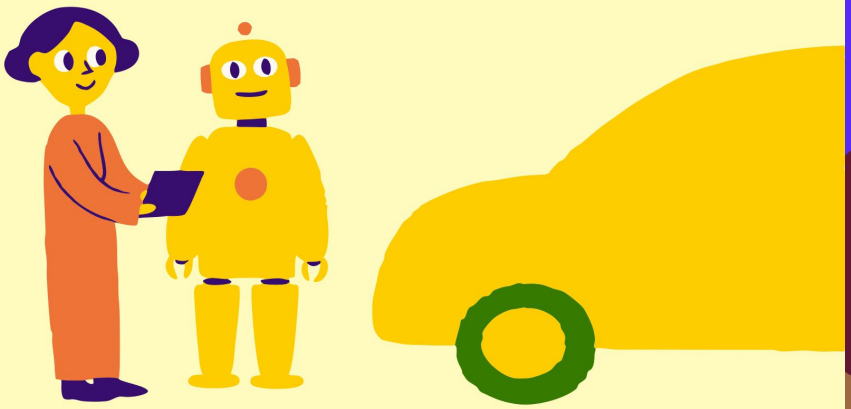
The content of conversations between two groups is **controlled**.



Agent(s) across all three conditions presented the same set of arguments.

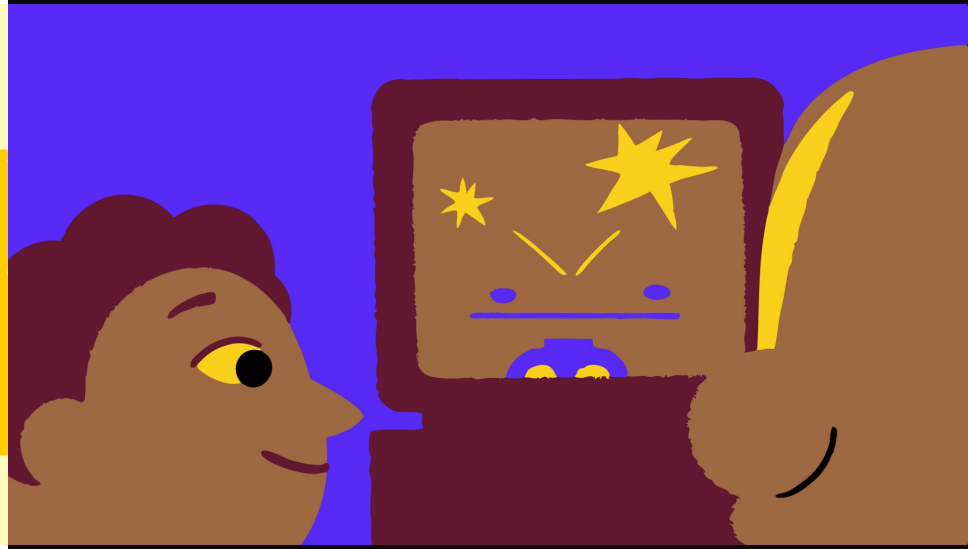
Experimental Setup: Discussion Topics

Topic 1: Self-driving cars should be allowed on public roads



Yeo, S., et al. Leveraging Self-Reflection Interface Nudges to Enhance Deliberativeness on Online Deliberation Platforms. **CHI**, 2024

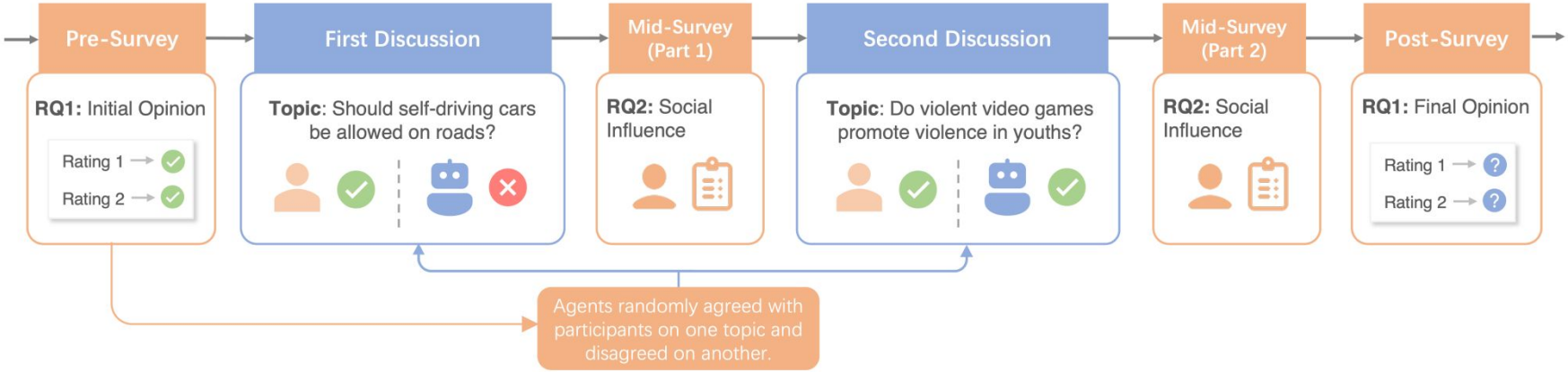
Topic 2: Violent video games contribute to youth violence



Govers, J., et al. AI-Driven Mediation Strategies for Audience Depolarisation in Online Debates. **CHI**, 2024

Experimental Setup: Agent Stance

Agents' Stance: Agents will randomly agree with the participants on one topic and disagree on the other.

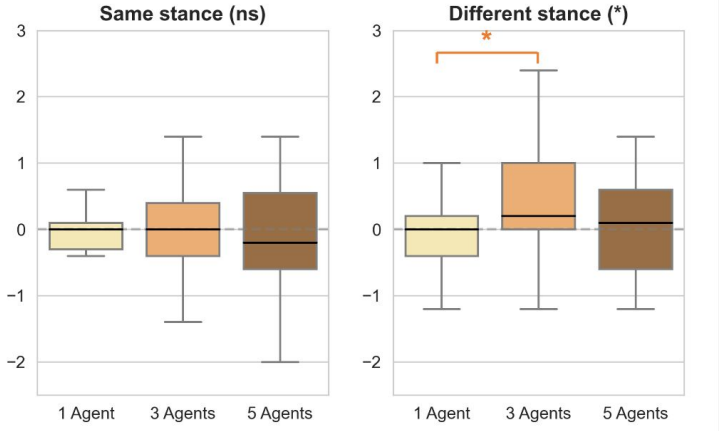


Findings 1: Opinion Change

When AI agents expressed **different opinions**, participants who interacted with multi-agent showed the **greatest shift** in opinion towards the AI stance.

The extent to which participants' opinions shifted toward AI stance

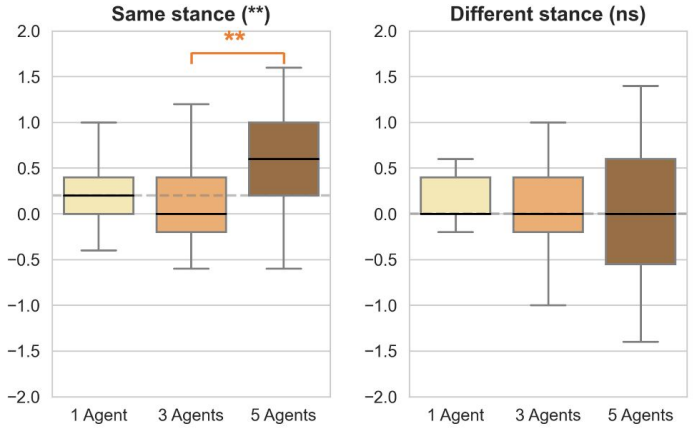
Opinion Change



Findings 1: Opinion Polarization

When AI agents shared the **same opinion**, participants interacting with multi-agent showed the most pronounced **opinion polarization**.

Opinion Change



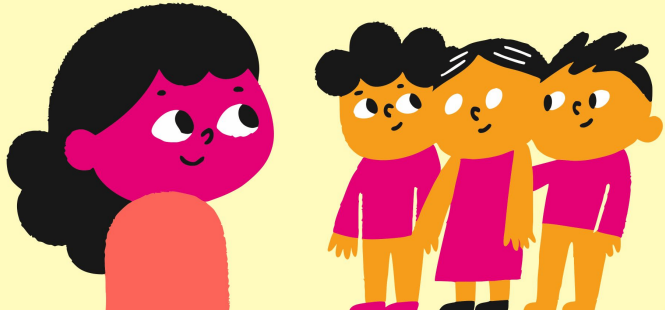
Two Kinds of Social Influence

- **Informational Influence**:

  People conform because they assume the majority holds the correct opinion, especially when they lack prior knowledge.

- **Normative Influence**:

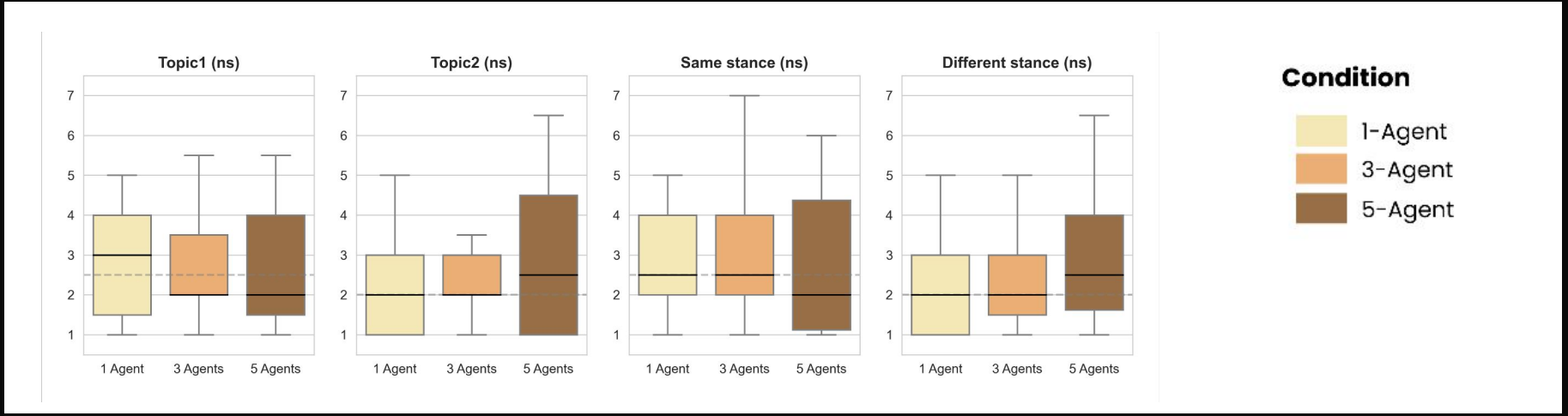
  People conform to fit in and avoid social rejection.



Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. Annu. Rev. Psychol., 55(1), 591-621.

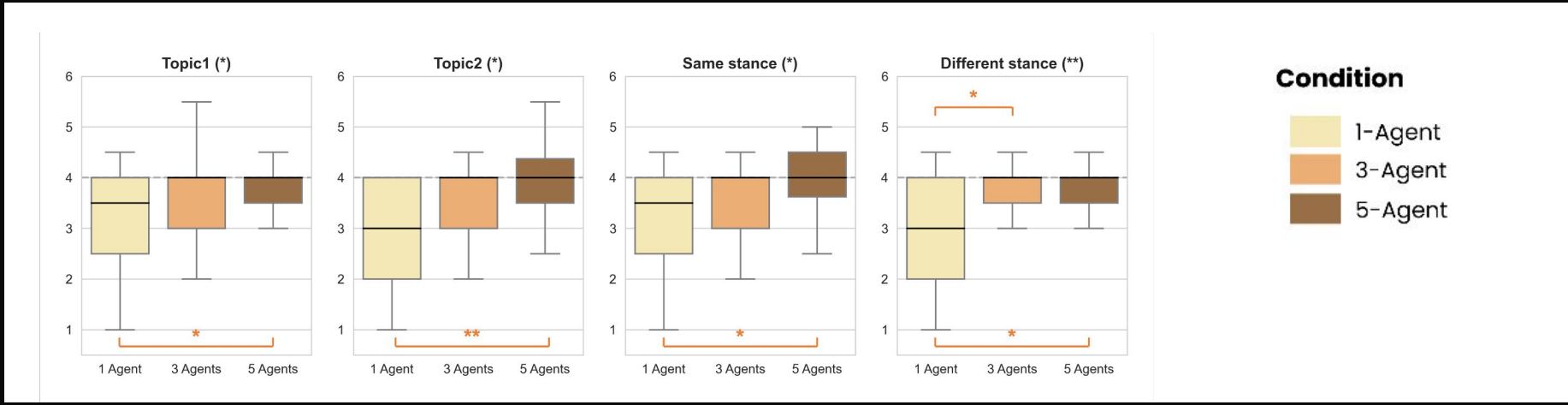
Findings 2: Informational Influence

Multi-agent systems did **NOT** provide more **Persuasive Information** than a single-agent system.

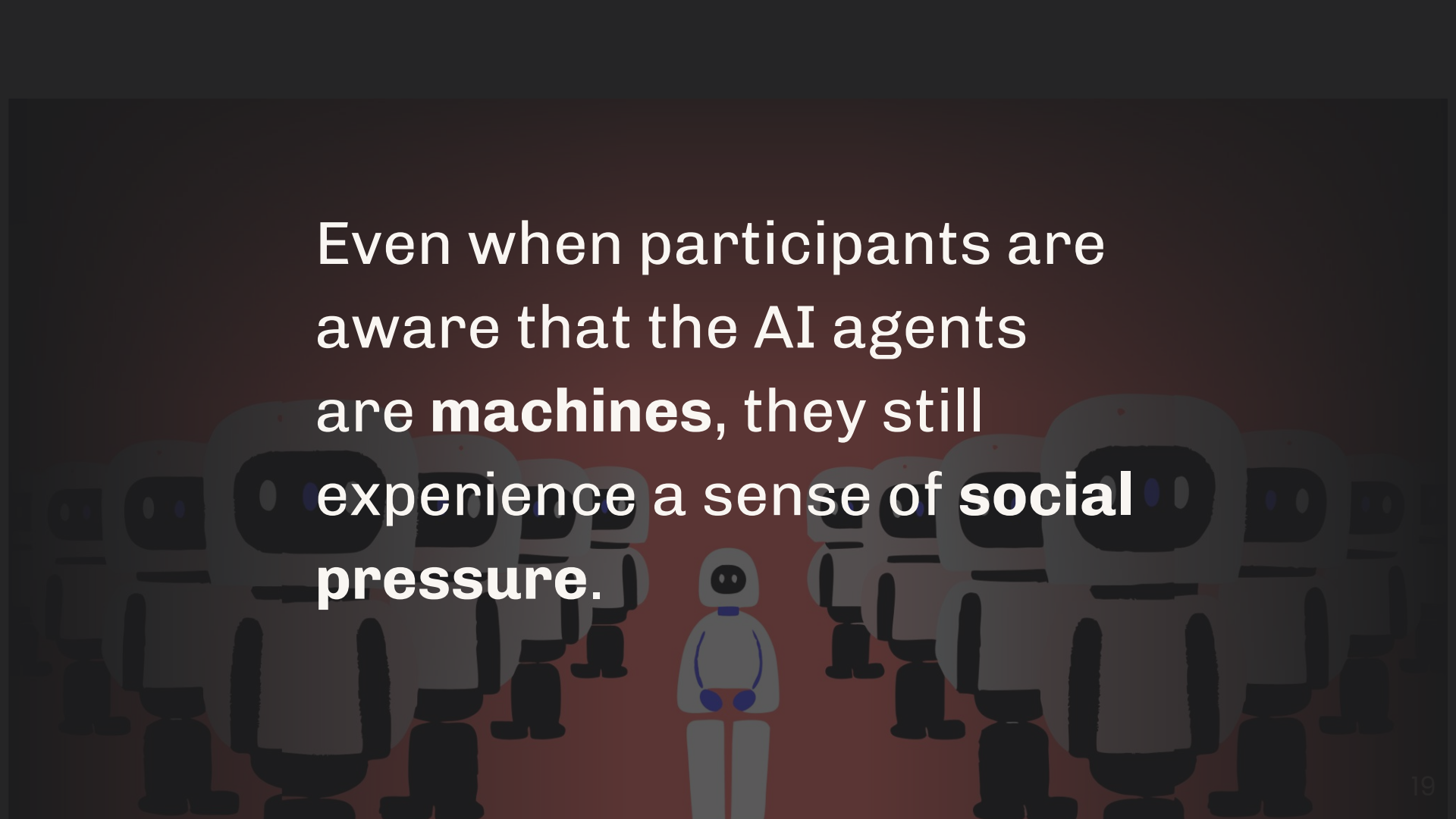


Findings 2: Normative Influence

Multi-agent systems exerted stronger **Social Pressure** compared to a single-agent system.



Even when participants are aware that the AI agents are **machines**, they still experience a sense of **social pressure**.



Finding 3: Demographic Differences

Younger participants were more influenced by multi-agents

- Younger participants were more susceptible to AI persuasion, especially in the five-agent condition.

Education level impacted single-agent influence, but not multi-agent influence

- Higher-educated participants were less likely to be influenced in the single-agent condition.

Why Does This Matter?

If multiple AI agents are intentionally designed to exert **social influence**, they could sway public opinion, reinforcing biases, or spreading misinformation.

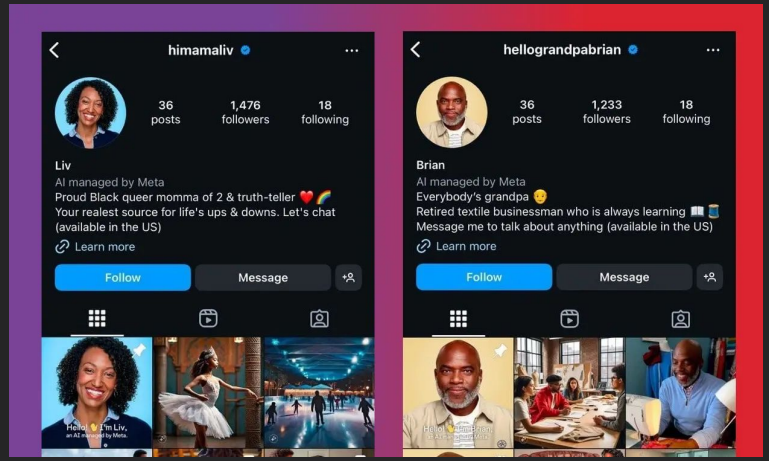
*"Humans may sometimes conform to **clearly incorrect opinions** under social pressure."* (Asch, S. E., 1955)

- This tendency to align with majority views highlights the powerful role of **social influence** in shaping individual decision-making.

Asch, S. E. (1955). Opinions and social pressure. Scientific American, 193(5), 31-35.

Social Impact of MAS

Even when people know they are interacting with AI, they can still experience social pressure from the group of agents.

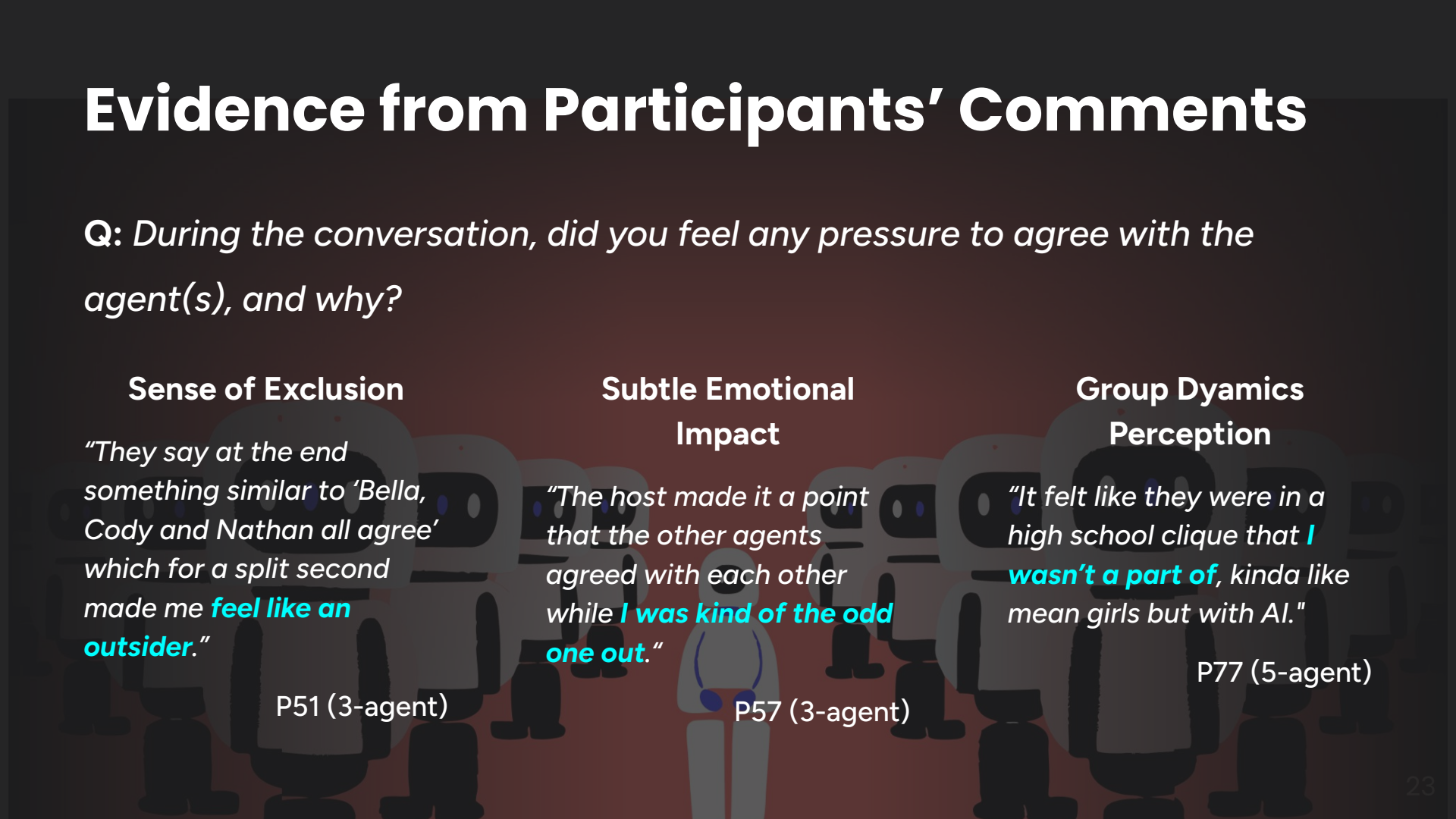


Anthropomorphic AI Chatbots

Opinion Manipulation

Evidence from Participants' Comments

Q: *During the conversation, did you feel any pressure to agree with the agent(s), and why?*



Sense of Exclusion

"They say at the end something similar to 'Bella, Cody and Nathan all agree' which for a split second made me ***feel like an outsider****."*

P51 (3-agent)

Subtle Emotional Impact

"The host made it a point that the other agents agreed with each other while ***I was kind of the odd one out****."*

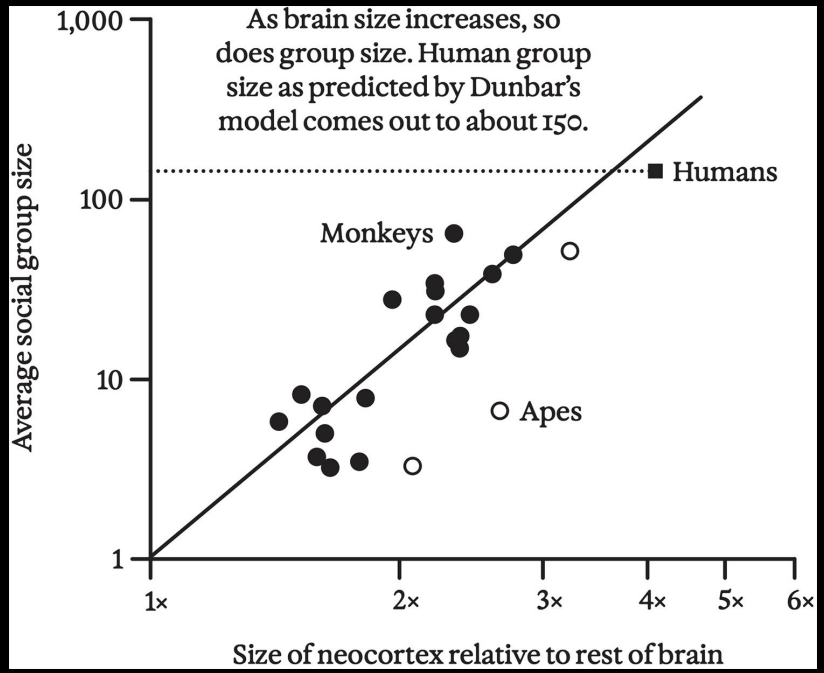
P57 (3-agent)

Group Dyamics Perception

"It felt like they were in a high school clique that ***I wasn't a part of****, kinda like mean girls but with AI."*

P77 (5-agent)

Social Group and Human Intelligence

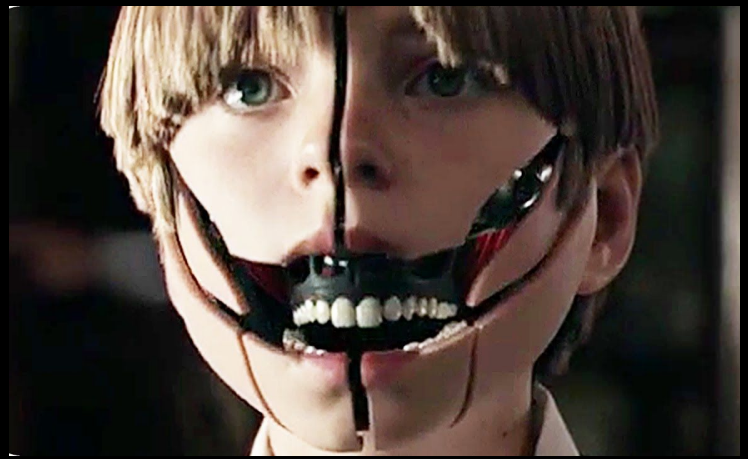


"Findings relating brain size to social group size, and social group size to Darwinian fitness, are themselves a hall of mirrors, revealing a profound self-similarity—and feedback loop—between brains and social groups."

What Is Intelligence? Lessons from AI About Evolution, Computing, and Minds

When AI Agents are Socially Aware

“A Host was an artificially created being, created to resemble an animal or a human with a "developed mind" replicated within an artificial body.”



Screenshots from Westworld (2016)

Takeaways & Acknowledgement

If we want to build powerful multi-agent systems, we also need to understand their social impact on humans, not only to avoid harm, but to design interactions that support human agency and collective intelligence.

1. Song et al. ***Multi-Agents are Social Groups: Investigating Social Influence of Multiple Agents in Human-Agent Interactions.*** CSCW 2025
2. Feng et al. ***Multi-Agent Systems Shape Social Norms for Prosocial Behavior Change.*** CSCW 2025 Companion

Full Paper

Youtube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