



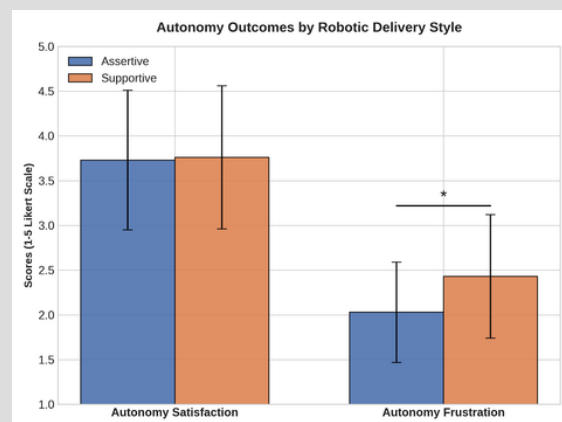
THE IMPACT OF CONVERSATIONAL DELIVERY STYLES ON PERCEIVED AUTONOMY DURING COLLABORATIVE IDEATION WITH SOCIAL ROBOTS

As Large Language Models (LLMs) transform social robots into proactive "solution-givers," their directive interventions risk reducing users from active co-creators to passive editors. This shift directly threatens the human agency and intrinsic motivation crucial for collaborative ideation.

01 INTRODUCTION

- Intrinsic motivation relies on **perceived autonomy** and **ownership** over choices.
- Human experts preserve learner autonomy through open-ended, supportive guidance.
- Conversational agency is actively negotiated **turn-by-turn** during live interaction.
- Vocal prosody and pacing signal turn-taking boundaries and conversational control.

We investigate how a robot's communicative **framing and turn-taking** mechanics impact perceived user autonomy



04 RESULTS

- Robot delivery style did **not significantly alter** the quantity of unique ideas ($t(18) = 0.40, p = 0.697$).
- Supportive delivery **marginally increased autonomy frustration** compared to the Assertive style ($p = 0.050$).
- Slower Supportive conversational pacing frequently **interrupted users** during natural cognitive lulls.
- The Assertive style functioned as a **predictable, unobtrusive** tool that maintained conversational agency.

Structural turn-taking execution is far more critical to preserving perceived autonomy than empathetic semantic framing.

Insight: Supportive delivery actively caused higher autonomy frustration due to rigid turn-taking mechanics

02 THE MAIN QUESTION



How does the conversational delivery style (**Assertive** vs. **Supportive**) of an LLM-driven robot affect perceived user autonomy and creative output?

- Investigate the structural mechanics of turn-taking and communicative framing.
- Evaluate psychological state and idea generation during a live brainstorming task.

Isolate the psychological impact of the robot's conversational behavior from the **actual** usefulness of its solutions

05 LIMITATIONS

- Relatively **small sample size** limits the statistical power of the quantitative findings.
- Lightweight, low-latency LLM **lacked reasoning complexity**, failing high user expectations.
- **Rigid pause-trigger threshold** inappropriately penalized users for natural cognitive silences.

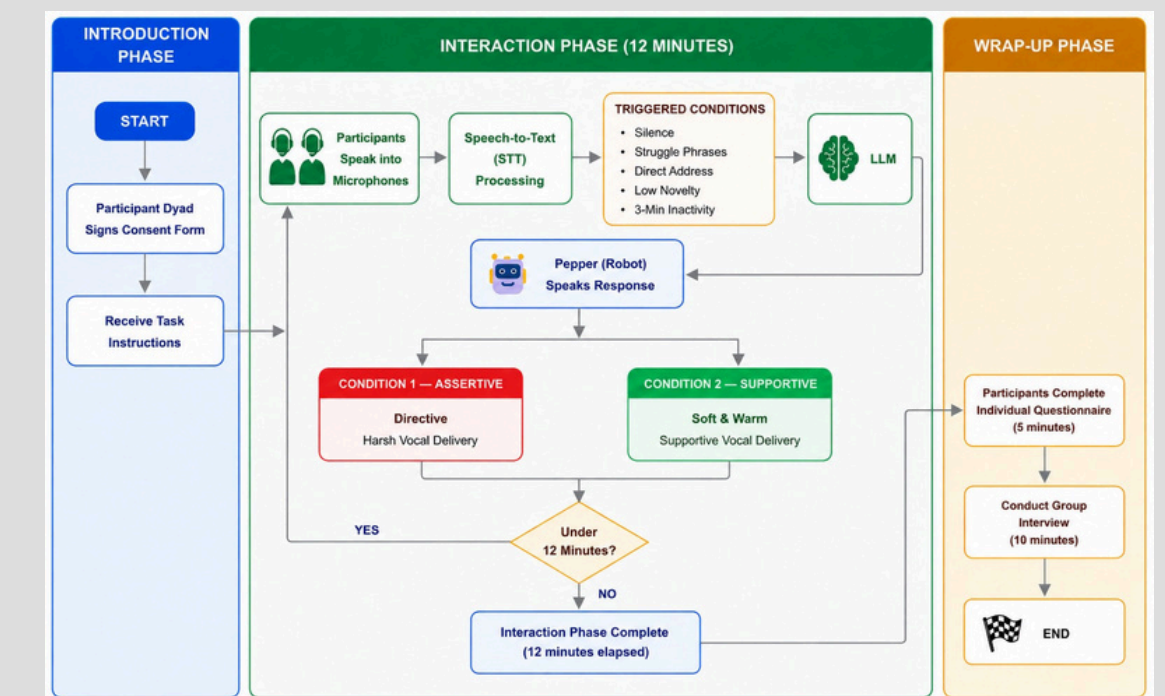
Flawed temporal mechanics serve as a stark reminder of the system's unyielding machine nature.

- Users relied on the **machine heuristic**, rapidly recalibrating to prefer a functional, utilitarian tool.
- Participants **actively critically refined** the robot's suggestions rather than passively accepting them.
- Clashing intended semantic warmth with rigid computational timing directly thwarts perceived autonomy.

Future robotic solution-givers must utilize **adaptive personas** that dynamically adjust turn-taking based on real-time user cognitive load

03 METHODOLOGY

- Controlled between-subjects experiment with 20 participant dyads.
- 12-minute collaborative campus-improvement brainstorming task.
- Pepper robot operated via a local, privacy-preserving LLM (phi-3.5-mini).



Assertive Condition:

- **Concise** phrasing and a **faster** speech rate

Supportive Condition:

- **Empathetic** phrasing and a **slowed** speech rate

GitHub Repository

<https://github.com/bogdanmicu12/Pepper/tree/ass/pro-branch>



06 CONCLUSION