Developing a Salience–Pragmatic Model of Collaborative Decision-Making

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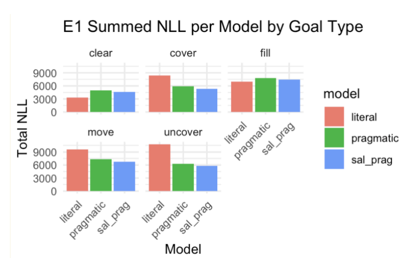
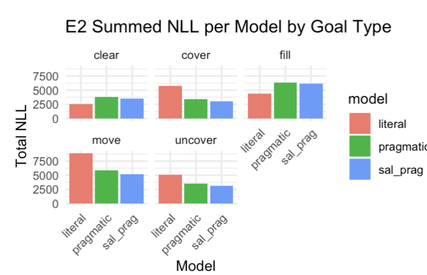
This summer, I studied how collaboration influences decision-making in a grid-based helping task, where participants assigned goals to complete. Prior behavioral analyses compared collaborative (E1) and solo (E2) play across three measures: move utility (useful vs. inconsequential vs. harmful), salience (the visual/spatial prominence of a move), and pragmatic clarity (how strongly a move revealed the hidden goal). Our analysis showed that collaboration promoted more useful, less salient moves, while solo players were more strongly driven by salience.

Building on these results, my primary focus was developing and refining a computational salience–pragmatism model. I began with two existing baselines: the literal model (capturing goal-directed but non-communicative choices) and the pragmatic model (capturing informative signaling). The salience-pragmatism model combined both salience and pragmatics in a weighted mixture.

To capture this balance, our model framework went through several iterations. First, we began with a linear weighting, combining salience and pragmatic values as a direct average: $\alpha \cdot$ Salience + $(1-\alpha) \cdot$ Pragmatism. However, after running simulations, we found that the linear weighting did not provide good fits to participant behavior. Next, we introduced a power function that raised salience to α and pragmatic ranks to β, though the pragmatism rank-based values produced poorly scaled probabilities. Finally, we replaced pragmatism ranks with goal probability matrices, which essentially directly captures how informative each move is. This final version best fit participant data, capturing both the communicative strategies of collaboration in E1 and the salience-driven tendencies of solo play in E2.



Ultimately, the salience–pragmatic model outperformed both the literal and pragmatic models, suggesting that players relied on both visual salience and communicative clarity. Beyond explaining our experiments, this framework demonstrates how iterative modeling can connect behavioral insights with formal theory, with potential applications to broader studies of communication and human–AI teamwork.



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