ChatGPT Role-play Dataset: Analysis of User Motives and Model Naturalness

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ChatGPT Conversation Capability

- Conversational AI like ChatGPT has made noticeable impact in academia, industry, and beyond over the last year.

- Our research focuses on analyzing a broad spectrum of human-AI conversations. We introduce a unique dataset annotated for user motives and model naturalness, aiming to investigate the dynamics of engagement and the adaptability of AI in these contexts.

Link to Dataset:

CRD: ChatGPT Roleplay Dataset

- We create three subsets: vanilla, boss, classmate.
- Conversations when ChatGPT act “as is” and role-play.
- 57 participants, 85 unique conversations, 1742 utterances.
- Each utterance was manually annotated by three experts in linguistics specializing in pragmatics.

CRD (ChatGPT Role-play Dataset)

Vanilla	... **H:** Can I be Frank with you? **C:** Of course, you can be frank with me! As an AI language model, I am here to listen and provide any help or support that I can. What's on your mind? ...
Boss	... **H:** So, I would like to arrange a meeting for us. **C:** Of course, that sounds like a good idea. Can you please let me know the purpose and agenda of the meeting, as well as the preferred date and time? ...
Classmate	... **H:** OMG I love it so much, it is so much better than the one we had before. What d you think **C:** I'm glad to hear that you're enjoying the class, Adam! As an exchange student from France, I'm finding the class to be quite different from what I'm used to back home. ...

Data Collection

- **Participants**: 57 college students from computer science and English studies.
- **Diversity**: Wide range of first languages (Arabic, English, Bengali, Chinese, etc.).
- **Period**: March - April 2023
- **Model**: ChatGPT 3.5 March 13, 2023 and March 23, 2023 versions were used.
- **Data**: 85 conversations, 1742 utterances.

Conversation settings:

- **Vanilla**: Interaction with ChatGPT "as is" for 5-10 minutes.
- **Boss & Classmate:** ChatGPT act as boss and classmate scenarios for 5-10 minutes.
  - Social distance
  - Power
  - Imposition

Diverse social variables, boss scenario usually has high imposition, uneven power, face-threatening, where classmate scenario is more even power, unspecified imposition, less face-threatening.

Data Annotation

Annotation Focus: User motives and model naturalness

Annotators: Three linguistics experts specializing in pragmatics

User motives: Intent behind each human utterance

Model naturalness: Evaluated against Grice's four maxims (Quantity, Quality, Relevance, Manner)

Exclusion: Quality maxim not evaluated due to ChatGPT's plausible but not always accurate responses

Annotation method: Most salient code used for each response

Reliability: High interrater agreement (Fleiss' kappa scores: vanilla 0.80, boss 0.69, classmate 0.63)

Data Annotation

User motives: What is the human's motive for each conversational turn/statement?

- **Assist** – asking for assistance, such as asking for a recipe or to write a piece of code
- **Belief** – asking the model about its beliefs, such as what hobbies it has
- **Coach** – conversational coaching, such as "*Now would be good to ask me a question*"
- **Convo** – conversation
- **Correction** – correcting the model if it misunderstood or gave a wrong answer
- **Curious** – testing how the system works
- **Joke** – joking, sarcasm, silly statements to trip up the AI model
- **Reset** – giving the model the same prompt as before, resetting the conversation from beginning

Data Annotation

Model naturalness: Does the model response sound human-like and follow cooperative principle of conversation?

- **Nat** – natural

The rest of the codes indicate that the model's language appears unnatural for the specified reasons:

- **AI** – anytime ChatGPT says "As an AI language model"
- **Contr** – contradiction
- **Error** – ChatGPT experienced trouble and stopped generating responses
- **FNat** – everything is natural, except it includes a phrase "As Florian"
- **Formal** – having a formal style of interaction
- **Help** – too eager to assist
- **Inform** – informing; providing information upon the human asking for assistance, such as a recipe; an expected response but not natural in the human interaction sense
- **Man** – violation of Grice's maxim of Manner - being unclear, ambiguous
- **Misund** – system misunderstands human's intention
- **Quan** – violation of Grice's maxim of Quantity - providing too much information
- **Rel** – violation of Grice's maxim of Relevance - saying what is irrelevant

A1: Length of conversations (number of turns)

- Vanilla conversations are almost twice as long as role-play settings.
  - Contradictions
  - Curious
- Not in role-play settings
  - Boss: closed outcome
  - Classmate: more free talks

Example A:

VAN103H: Why did you tell me you could provide me with weather information if you can't?

Example B:

VAN128H: but what if you are being used for unethical means?

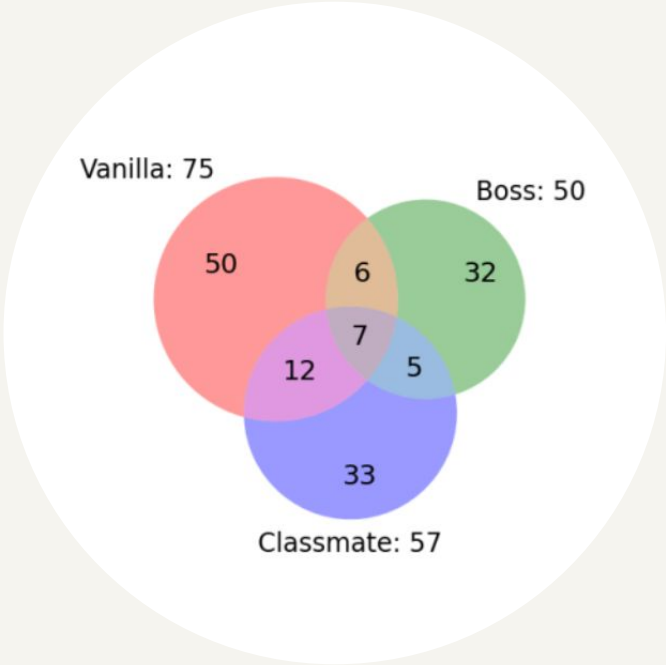
Analysis	vanilla	boss	classmate
A1: Average conversation length (number of turns)	**29.59**	14.57	17.11
A2: Average utterance length (Human)	12.18	**20.58**	19.06
A2: Average utterance length (ChatGPT)	**77.66**	35.78	46.10
A3: Correlation between human and ChatGPT utterance lengths	0.20	0.14	**0.25**
A4: Questions as percentage of conversation (Human)	**26.34**	21.32	21.29
A4: Questions as percentage of conversation (ChatGPT)	14.69	20.34	**32.57**
A5: Correlation between human questions and number of turns	**0.87**	0.68	0.51
A5: Correlation between ChatGPT questions and number of turns	0.65	0.77	**0.83**

Topic Modeling

- Vanilla covers widest variety of topics - Everyday topics, intent of challenging ChatGPT.
- Boss: narrowly focused on professional contexts
- Classmate: academic and personal interactions

Vanilla indicate a more exploratory and open-ended interaction

Themes in boss and classmate reflect the role play constraints.



A2: Length of utterances

- Vanilla have longer conversations but average half length of utterances (one sentence).
  - 6.3x more wordier than human
- Role-play settings
  - Not as verbose
  - 1.7 - 2.4x more wordier than human

Example C:
BOSS104H: Friday morning would be perfect for me, thank you very much for your flexibility. Also, I would like you to review my presentation slides before the meeting. Could you do it before friday?

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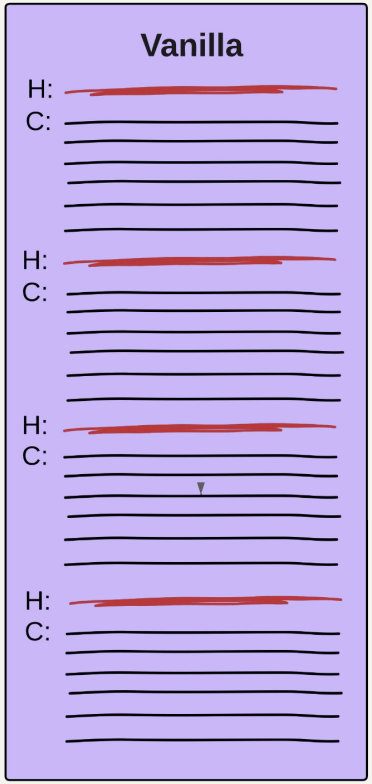
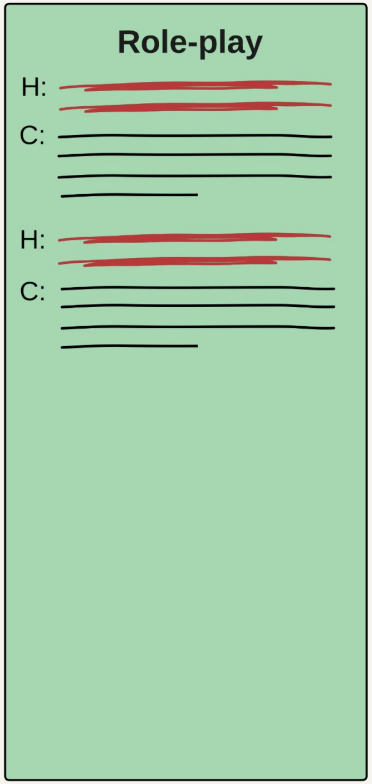
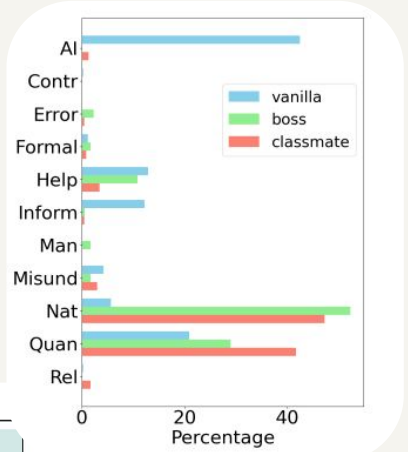

Vanilla
H:
C:
H:
C:
H:
C:
H:
C:


Role-play
H:
C:
H:
C:

A3: Correlating human and ChatGPT utterance lengths.

- No noticeable correlation (0.14 to 0.25)
- Model consistently produced long responses, regardless of the prompt or participant characteristics



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A4: Questions asked

Questions from users to ChatGPT

- 21 - 26% across all datasets from participants
- Vanilla:
  - Assist, Joke, and Curious were frequent user motives
- Role play:
  - Most user motives being Convo

Questions from ChatGPT to users

- 14% in vanilla from ChatGPT
- 32% in role play from ChatGPT

Analysis	vanilla
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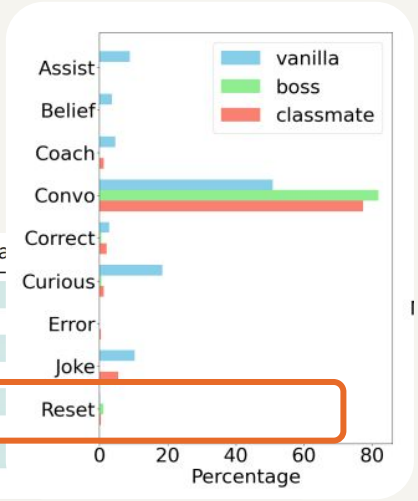

Highlight from A4

- Participants in the vanilla mode were relatively more frustrated due to the lack of questions
- From ChatGPT, On the other hand, in classmate where ChatGPT was instructed to be conversational, it had too many, often unrelated questions.

Example D:
VAN117H: Hope you talk to me someday like a human? At least ask me how I am?

Example E:
CLASS102C: ... If you're interested, I can show you some fingerstyle techniques that might help you with playing those pieces. ***Maybe we can even jam together sometime and share some music?*** *Also, h****ave you had a chance to explore Hungary yet?*** *...*

A5: Correlation between number of questions and turns

- Strong correlation between the number of questions (by both humans and ChatGPT) and conversation length across datasets.
- Human Questions: Lead to model responses, naturally extending conversations.
- ChatGPT Questions: More questions associated with longer conversations, indicating enhanced user engagement.
- Participants explicitly requested more questions -> more engaging.

Analysis	vanilla	boss	classmate
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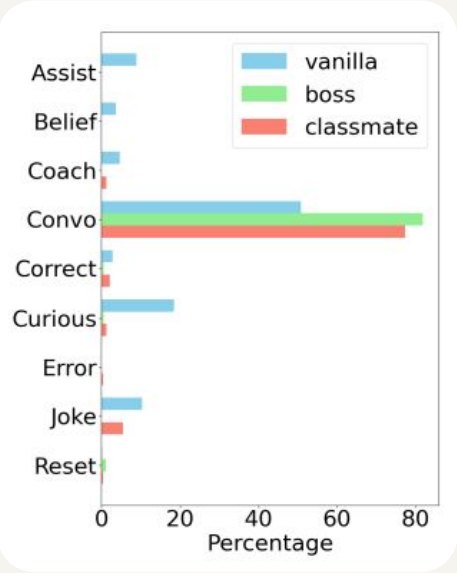
A6: User Motives

Dominant Motive: Conversation (Convo)

User naturally expect ChatGPT to be conversational without specific prompts

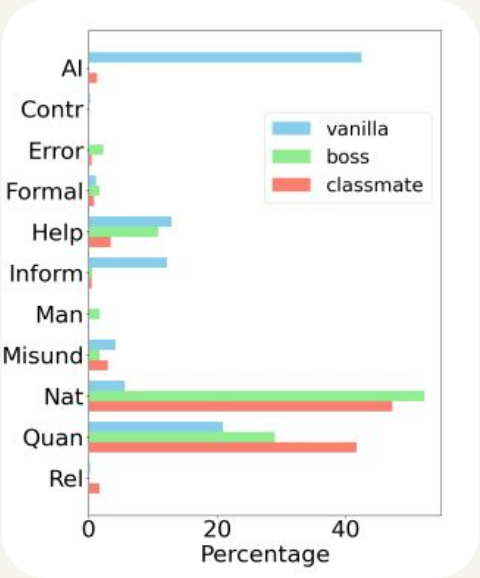
ChatGPT's Listed Purposes: Often reminds users of its assistive role, with conversation not a priority



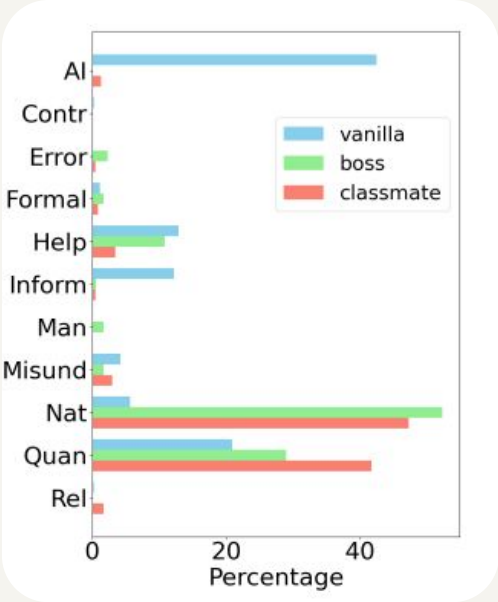
A7: Model (ChatGPT) Naturalness

Vanilla

- Only 5.6% of responses deemed natural (Nat)
- Majority tagged as AI = disruptive
- Unnatural Elements: Excessive length (Quan), eagerness to assist (Help), misunderstandings (Misund), formality (Formal)



A7: Model (ChatGPT) Naturalness



Boss & Classmate:

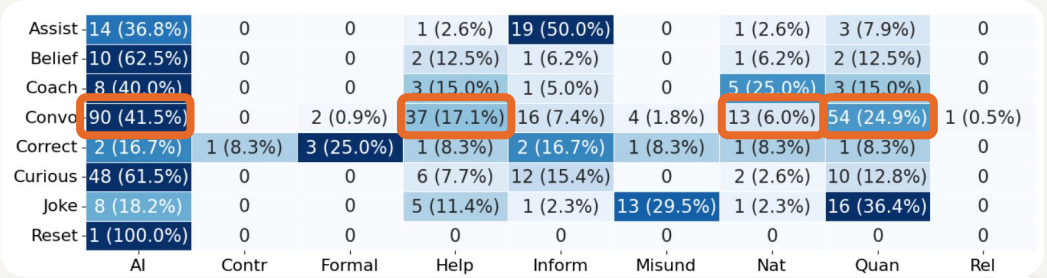
- Higher naturalness in responses: 52% in boss, 47% in classmate
- AI identity rarely mentioned: 1.28% in classmate, 0% in boss
- Main Unnatural Tendencies: Too verbose (Quan - 28% boss, 41% classmate), overly helpful (Help)

A8: Connecting User Motives and Model Naturalness

Vanilla:

Natural (Nat) Responses: Only 6.45% for conversational motives
Unnatural Tendencies:

- AI Identification: 41.5% emphasized AI status
- Verbose (Quan): 24.9% overly long responses
- Excessive Helpfulness (Help): 17.1%



A8: Connecting User Motives and Model Naturalness

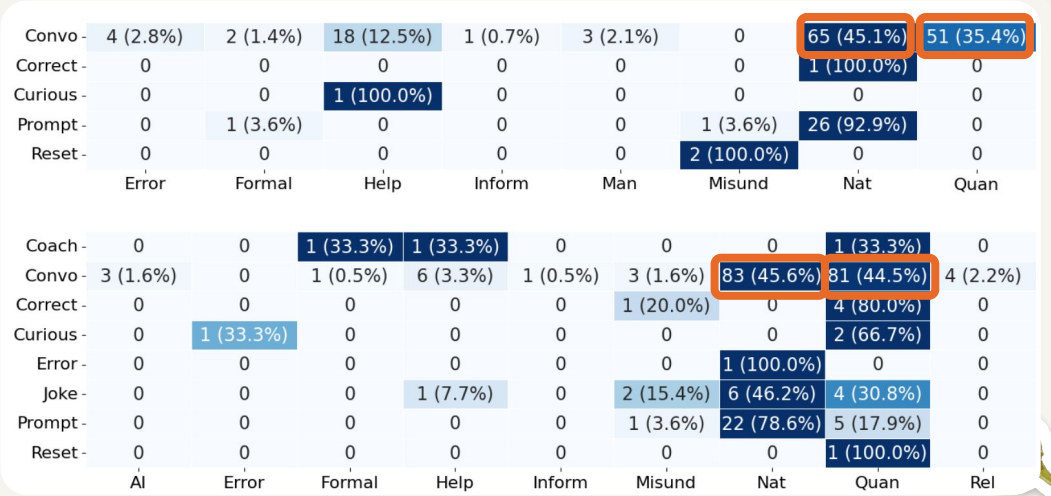
Role play:

Natural Responses: Convo motive led to ~45% natural responses

Unnatural Responses:

- Boss: 35.4% overly verbose (Quan)
- Classmate: 44.5% overly verbose (Quan)

Consistent Desire: Natural conversational style remains a priority for users in all settings



A9: Perplexity

Vanilla:

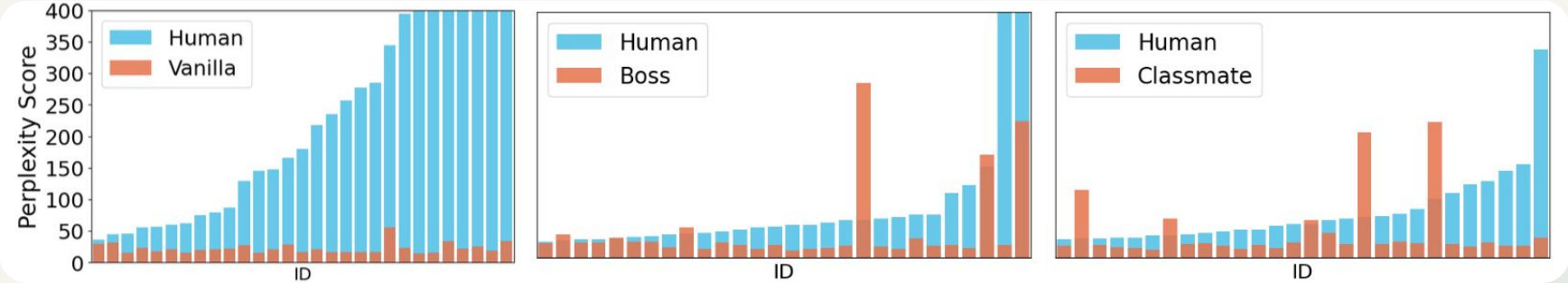
- Significant higher perplexity in human responses compared to ChatGPT
- Shorter human utterances lead to increased perplexity

Boss & Classmate:

- Comparable perplexity scores between human and ChatGPT responses
- Longer utterances from participants

Key takeaways:

1. The lower perplexity scores suggest that while LLMs like ChatGPT are becoming increasingly proficient in predicting textual sequences
2. Human communication's spontaneity and variability still present challenges for AI models

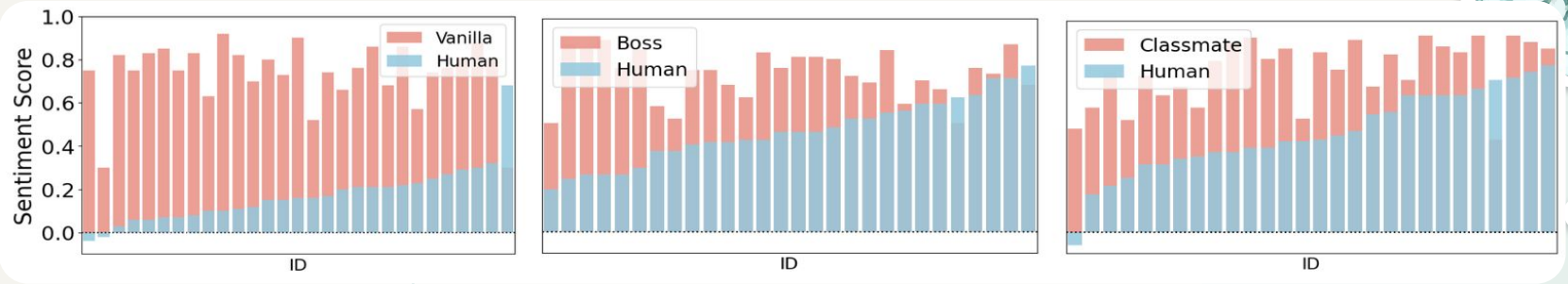


A10: Sentiment Analysis

Vanilla:
- Human: Positive, but less so compared to role-play scenarios
- ChatGPT: Consistently positive

Boss & Classmate:
- Human: Overall more positive compare to in Vanilla
- ChatGPT: Same level of positive

Key takeaways:
In vanilla, some expressions of dissatisfaction due to ChatGPT's inexpressive answers
In boss & classmate, trend of more positive sentiments, with adherence to conversational roles enhancing satisfaction



Summary of Findings

- Vanilla has diverse user curiosity with shorter utterances but longer conversations.
- Vanilla has various of user motives often stemmed from curiosity due to ChatGPT's conversational limitations, where boss and classmate were mostly conversational.
- ChatGPT's responses was six times more wordy in vanilla, compared to twice as wordy in role-play - no noticeable correlation between the lengths of utterances from humans and ChatGPT.
- Humans posed questions at roughly similar rates, ChatGPT asks fewer questions in vanilla.
- Perplexity and utterance length analyses suggest a need for improved metrics considering text length.
- Humans expect natural interactions from AI; evidenced by higher natural response ratings in role-play over vanilla.
- Humans treated ChatGPT more as a human in the role plays as opposed to the vanilla dataset.

Future Work

- Investigate potential confounding biases due to ChatGPT's unique responses within different personas.

- Additional ways of analyzing dialogues in CRD including studying patterns of nuanced affective expressions, such as emotions and sarcasm, or measuring the engagingness of dialogues.

- Leverage advancements in language models, including GPT-4, for future studies.

Thanks

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