

Speech-Based Quality Analysis in COA Administration: Profiling Clinician Behaviors in MADRS Interviews

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Introduction

- CNS clinical trials rely on clinician-administered scales like the Montgomery-Åsberg Depression Rating Scale (MADRS)
- Secondary review can help improve data quality and identify sources of placebo response
- **Manual secondary review** does not scale; interviews are missed and feedback is lagged
- **Automated secondary review** offers a near real-time, cost-effective alternative to manual review

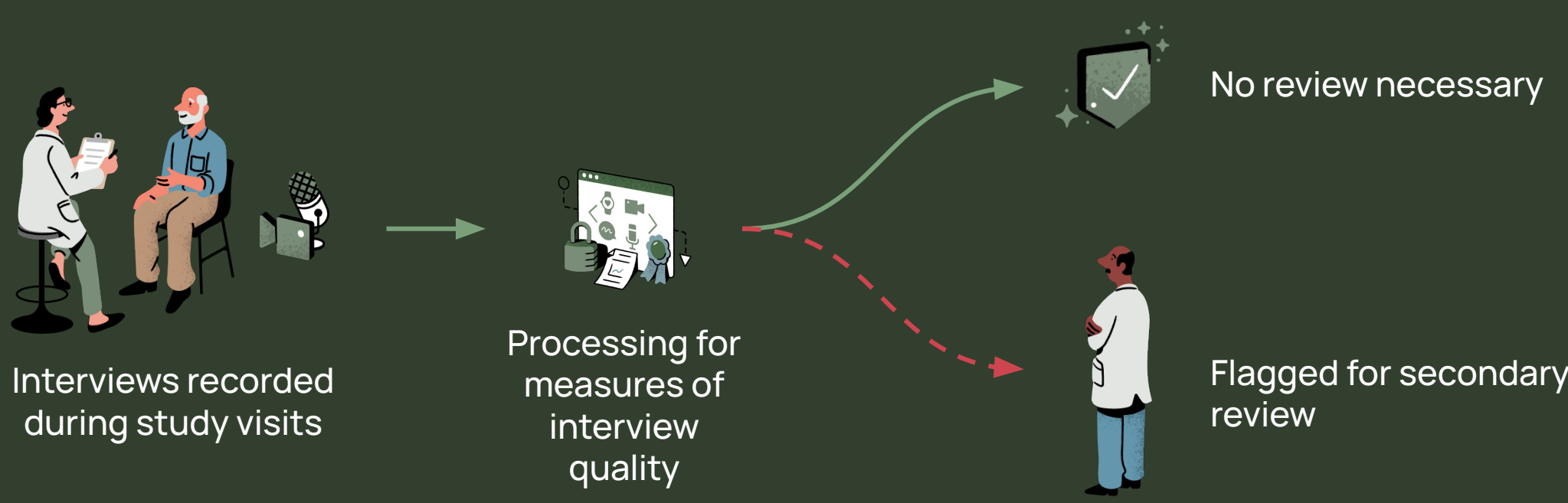


Figure 1: Automated secondary review pipeline

Methods Data

- Four MADRS interviews were administered by a trained rater on a healthy volunteer
- The rater intentionally used a different interview style in each administration (Textbook/Structured, Unprepared/Disorganized, Rushed, Friendly/Therapeutic)
- These profiles were chosen to simulate a range of ways in which raters could stray from protocol

Rater Behavior Analysis

- Using the clinician’s speech, we can quantitatively measure behaviors specific to scale administration
- This includes:
 - Low adherence to script; no follow-up / out of order questions
 - Rushed administration; interruption of patient speech
 - Accessible language
 - Presence of therapy
- Finally, we used a Large Language Model (LLM) to aggregate transcript and quantitative measures and generate feedback on the quality of the interview

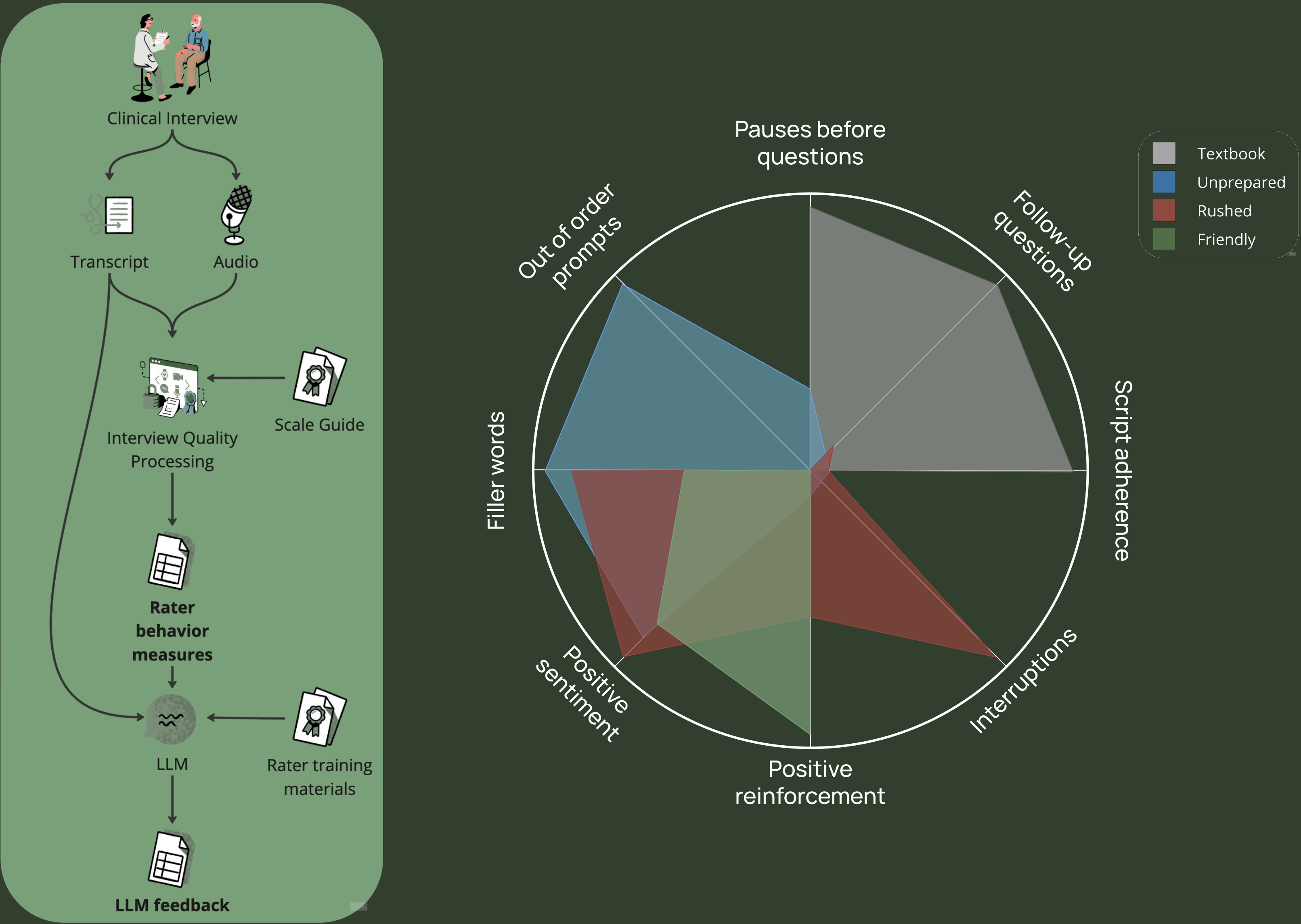


Figure 2, Left: Processing recordings for interview quality. Right: Radar plot comparing a subset of rater behavior measures calculated across the four different clinician profiles

Results

- We compared the rater behavior measures from the three irregular profiles to the reference profile and reported significant differences
- The disorganized profile showed poor structure and weak follow-up. The rushed profile prioritized speed, with frequent interruptions and short pauses. The therapeutic profile emphasized validation and positivity.
- Extracted highlights from the feedback provided by the LLM showed meaningful insights which align with expectations like: “appears impatient” for the Rushed profile and “risks over-empathizing” for the Therapeutic one.

Conclusions

- This experiment demonstrates that measures derived from rater speech during MADRS interviews can be used to detect deviations from expected clinician behavior.
- Importantly, this approach enables us to monitor all interviews and detect anomalies earlier.
- As a result, data quality is enhanced, improving the detection of meaningful treatment effects.

Structured, balanced

“The clinician conducting the interview demonstrates a **strong adherence to the structured guidelines** outlined in the MADRS SIGMA manual ... appropriately **follows up to clarify the severity and frequency of symptoms**, demonstrating a balance between ... **high standard of interview quality and reliability.**”

Disorganized and passive

“... However, there are some areas where further refinement could enhance the interview. The clinician sometimes **uses filler phrases** (“ok,” “um,” “all right”) which could detract from a focused exploration of symptoms. They occasionally seem to **overlook or underexplore follow-up prompts on key symptoms**, such as confirming ...”

Dominant, reinforcing

“... the clinician appears **impatient and skips over certain questions**, as seen in their decision to skip exploring concentration difficulties due to a subjective judgment ... their **manner occasionally imposes an overly simplified perspective on complex symptoms**, limiting the opportunity for nuanced responses.”

Positive, validating

“aligns with MADRS SIGMA’s guidelines ... However, the clinician occasionally **risks over-empathizing**, which could lead to subjective reinforcement ... use phrases like “that’s great” and “good job,” which, while encouraging, could **unintentionally minimize the severity of symptoms by focusing on positive interpretations.**”

