A Novel Speech Assessment Protocol for Measuring Emotional Expression: Preliminary Findings

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Methodological Issue Being Addressed Traditional affective and cognitive assessments rely on self-report and structured tests, which are limited by subjective bias and low ecological validity. Speech-based measures provide objective, continuous indicators of emotional and cognitive states, but challenges remain in creating paradigms that balance standardization with natural expression. This study introduces a semi-standardized, multi-task speech paradigm using standardized prompts to elicit natural speech and evaluates its feasibility, data quality, and clinical relevance.

Introduction The primary objective was to evaluate the feasibility and data characteristics of the speech paradigm administered in person. Specifically, we assessed and hypothesized:
(1) the proportion of participants completing all four speech tasks; we hypothesized that >75% of participants would be able to complete all tasks
(2) speech sample length; we hypothesized that participants would be able to produce >30s of free speech across tasks
(3) number of pauses and their duration; we hypothesized that these variables would not differ between task types;
(4) correspondence between linguistic sentiment and prompt valence; we hypothesize that each prompt's valence elicits a distinct response valence, e.g., negative word ratios in answers to negative prompts differ significantly from those in responses to positive, neutral, or ambiguous prompts.
(5) participant evaluation of task clarity, comfort, and engagement; we hypothesized an average rating of ≥4 on a scale from 1-5.

Methods The study aims to recruit 80 participants; data from 27 are presented. Each participant completed four storytelling tasks designed to elicit positive, negative, neutral, or ambiguous tones. For each sentiment, 20 prompts were generated by ChatGPT-4o and analyzed for sentiment; the top two were selected. Participants created short stories based on these prompts, and speech samples were recorded, transcribed, and analyzed for acoustic and linguistic features (e.g., duration, pause metrics, lexical sentiment). For all features we computed within subjects ANOVAs using the prompt valence as the within subject variable. To test aim (4) in particular, for each lexical feature, a planned within-subject contrast was defined as the difference between the target condition (e.g., negative word ratio for negative prompt) and the mean of the remaining conditions and tested against zero using one-sample t-tests.

Results Feasibility was high, with 23 of 27 participants (85.2%) completing all tasks. Story lengths ranged from 52–67 seconds and 82–97 words. Pause duration differed between conditions (0.81–1.32s, $p<0.05$), but pause count did not (15–17, $p=0.68$). Responses to the negative prompt showed higher negative word ratios than responses to other prompts ($p<0.02$), while other prompts did not show significant effects ($p=0.051$–0.2). Usability ratings ($n=17$) averaged 4.53 ± 0.80.

Conclusion Findings indicate that the semi-standardized paradigm is feasible, engaging, and capable of producing high-quality speech samples. High completion rates and consistent story lengths support usability. Differences in pause duration but not frequency suggest sensitivity to task variation without compromising comparability. Valence alignment emerged only for the negative prompt, indicating detectable but asymmetric emotional correspondence. Overall, the paradigm shows promise for assessing affective expression, with opportunities to refine prompts to improve differentiation across conditions.

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