Gathering normative speech data for depression research remotely, using online task marketplaces

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SUBMISSION DETAILS

What is the Methodological Question Being Addressed? We seek to determine the quality, usability and generalizability of speech samples collected remotely using online task marketplaces such as Amazon Mechanical Turk (mTurk) for normative data collection in depression research.

Introduction Major Depression is currently monitored via subjective symptoms including low mood, changes in sleep and difficulty concentrating, which present heterogeneously and may reflect multiple underlying etiologies. Non-invasive technologies, including the assessment of speech, could help delineate clinically meaningful subtypes and assist with therapeutic development. To understand the relationship between speech and depressive symptoms, large representative samples of speech are needed. The objective of this study was to evaluate whether speech data collected through a distributed online platform was of sufficient quality for use as normative data in depression research.

Methods We used Amazon's Mechanical Turk (mTurk) to collect speech assessments from a normative sample. Participants provided basic demographic information, completed a Patient Health Questionnaire-9 (PHQ-9) and provided speech samples. Speech tasks included sustained vowel phonation, phonemic fluency, picture description, positive fluency (listing positive events that will occur), and prompted narrative. To ensure participants were paying attention to the task, we asked a validation question ("Have you ever had a fatal heart attack while watching TV?"). Sampling was restricted to English speakers, aged 20-60, in the United States.

Results A total of 2779 samples were collected from 627 individuals. 136 of the samples had no recorded speech. The remaining samples were of varying quality, due to differences in hardware and recording conditions. Based on manual data checks, we identified 30 low audio quality samples, 16 samples where task instructions were not followed, and 7 samples with overwhelming background noise. Seventeen participants were excluded for failing the validation question. Examination of response latencies for PHQ-9 questions revealed bi-modal distributions, with a group of individuals with mean response times < 2500 ms. We hypothesized that very short response latencies were indicative of inattention, and applied a latency cutoff of 2500 ms for mean response times. After these data cleaning steps, the sample size decreased to 1964 samples from 417 participants (66.5% of the original sample). Based on the PHQ-9 cutoff score of 10, 23.9% of the sample met screening criteria for depression. The dataset was collected in 96 hours at a cost of $851.88 USD (<$2USD per participant).

Conclusion This study demonstrates that remote collection of normative speech data is feasible using online task marketplaces. The rate of depression in participants was higher than expected,

possibly indicating selection bias or increased depression relating to the COVID-19 pandemic. Data cleaning procedures identified a number of quality issues, including missing or low quality audio, failed validation questions, and very short response times. Despite these shortcomings, the cost and speed by which data can be collected makes well-designed remote studies of this nature a viable option for collection of normative data, provided that systematic quality checks of the data are implemented.

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Keywords

Keywords
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Guidelines I have read and understand the Poster Guidelines

Disclosures if applicable Celia Fidalgo, Mengdan Xu, Aparna Balagopalan, Jessica Robin, Liam Kaufman and William Simpson are employees of Winterlight Labs.

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