Spark Mind

Cognitive Assessment Report

Overview

This report presents a cognitive assessment based on a series of digital tasks and speech analysis. The assessment incorporates metrics from cognitive games (Stroop Colour, Memory Recall, Object-Purpose Matching) and evaluates speech patterns for indicators of cognitive function. Sentiment analysis of spoken language is also included to provide a more comprehensive understanding. This report aims to identify potential areas of cognitive strength and weakness, informing further evaluation and personalized recommendations. Note that some game scores are currently represented by placeholder zeros due to the games not being implemented.

Metrics Explanation

The assessment incorporates several metrics, each designed to evaluate different aspects of cognitive function:

* **Stroop Colour:** (Score: 0). This task measures selective attention and cognitive flexibility. Participants are asked to name the colour of a word while ignoring the word's meaning (e.g., the word "blue" printed in red ink). A lower score (or longer completion time) suggests difficulties with executive function, particularly interference control.
* **Memory Recall:** (Score: 0). This task assesses episodic memory and the ability to encode, store, and retrieve information. Participants are presented with a series of items and are later asked to recall those items. A lower score indicates potential issues with memory encoding or retrieval.
* **Object-Purpose Matching:** (Score: 0). This task evaluates semantic memory and the ability to associate objects with their intended functions. Participants are presented with an object and a set of purposes and are asked to select the correct match. A lower score may suggest difficulties with semantic knowledge or executive function.
* **Speech Metrics:** These metrics analyze various aspects of spoken language, including pause time, filler word usage, lexical diversity, and speech fluency. These parameters can provide valuable insights into cognitive processes related to language production, thought organization, and cognitive effort.
* **Sentiment Analysis:** This analyzes the emotional tone of spoken language. It identifies the presence and intensity of different emotions (e.g., positive, negative, neutral) and calculates a weighted sentiment score. Changes in sentiment and deviations from a neutral baseline can reflect emotional state, cognitive biases, or underlying mood disorders.

Speech Analysis

The speech analysis reveals the following:

* **Total time:** 18.8 seconds
* **Total pause time:** 16.36 seconds

* **Pause density:** 46.53%
    * *Interpretation:* A high pause density suggests potential difficulty with speech fluency and word retrieval. Excessive pausing can be indicative of cognitive effort or underlying language processing issues.
* **Repeated words:** 14
    * *Interpretation:* Repetition can be a sign of difficulty finding the right words or maintaining a train of thought.
* **Filler words:** 5 (9.09%)
    * *Interpretation:* The use of filler words (e.g., "um," "uh") is relatively low (9.09%). While some filler word usage is normal, a high frequency can indicate hesitation, uncertainty, or difficulty with verbal fluency.
* **Unique words:** 34
* **Lexical diversity:** 61.82%
    * *Interpretation:* Lexical diversity, measured at 61.82%, is a measure of the range of vocabulary used. Reduced lexical diversity can be associated with cognitive decline or language impairment.
* **Speech fluency:** 56.17 words/sec
    * *Interpretation:* The speech fluency measured at 56.17 words/sec appears unusually high and may be erroneous. Typical speech rates are much lower and should be carefully verified against the raw audio.

Sentiment Analysis

The sentiment analysis indicates:

* **Overall sentiment:** Neutral
* **Sentiment probabilities:** The distribution of sentiment probabilities shows a strong leaning towards neutral (70.75%), with small probabilities for negative (4.13%), positive (5.76%), and slightly higher probabilities for somewhat negative (14.42%) and somewhat positive (4.95%).
* **Weighted score:** 62.06
    * *Interpretation:* The neutral sentiment suggests that the speaker's emotional state during the speech sample was relatively stable and unbiased. However, the presence of small probabilities for negative and somewhat negative sentiment warrants consideration. The provided transcript "E. You woke up late today. Um, then I went to the kitchen, and I, uh, I made tea. I sat down, sat down in the chair and, and just stared at the clock. You know, I was thinking about the river, the river near my old house. Mango trees, paper boats, it's A." supports this, indicating a recall of possibly fond memories.

Integrated Interpretation

The cognitive assessment reveals a profile characterized by potentially impaired speech fluency (high pause density, some repeated words) and a neutral sentiment. However, the extremely high fluency rate needs validation. The placeholder scores for the cognitive games limit a more comprehensive interpretation of cognitive function. The speech patterns suggest potential challenges with language production, word retrieval, or executive function. While the neutral sentiment provides some reassurance against immediate emotional distress, the small probabilities for negative sentiment should not be ignored. The high pause time in relation to total time is a key factor, but should be considered in relation to the task that was actually performed.

Recommendations

Based on this initial assessment, the following recommendations are made:

1. **Repeat the speech task:** A repeat recording and analysis of a free speech task would help validate the high pause density measurement and help understand the context in which it occurs.
2. **Implement and administer the cognitive games:** Implementing and administering the Stroop Colour, Memory Recall, and Object-Purpose Matching tasks will provide valuable quantitative data on specific cognitive domains.
3. **Consult a speech-language pathologist:** Given the indicators of potential language processing difficulties (high pause density, some repeated words), consultation with a speech-language pathologist is recommended. A speech-language pathologist can conduct a more thorough evaluation of language skills and identify any underlying speech or language disorders.
4. **Monitor sentiment and emotional well-being:** While the current sentiment analysis indicates a neutral state, it is important to monitor for any changes in sentiment or emotional well-being.
5. **Consider a comprehensive neurological evaluation:** If concerns persist regarding cognitive function, a comprehensive neurological evaluation, including neuropsychological testing, may be warranted. This can help to identify any underlying neurological conditions that may be contributing to cognitive changes.

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