Overview of the Experiment

This experiment was designed to understand how people store and process the meaning of words, concepts, and objects in their minds. In the experiment, participants are shown a target word along with three choice words. They are asked to choose which word is most related to the target. The goal is to measure how words are related in meaning (semantic association) or how similar they are based on visual features.

Besides semantic meaning, the experiment also includes matching based on visual features like color, size, texture, and shape. This helps compare semantic processing with feature-based processing, to see which one is faster and more difficult.

For the semantic condition, there are two levels - "high" (strongly related) and "low" (weakly related). The experiment analyzes whether response time is significantly different between these two levels.

Running the Experiment

- Initial Setup:
  1. Access to PsychoPy (http://www.psychopy.org)
  2. Click ‘Download’ in the top menu and choose the setup file that matches your operating system.
  3. Finish the setting followed by instruction.

- Loading the Script:
  1. Download the necessary files to run the experiment in PsychoPy.
     1) In the PsychoPy Coder window, go to the top menu and click **File - Open**, then select **Part_1.py** and click **Open**.
     2) In the same location as the **Part_1.py** file, create a new folder named **sampledata**, and download the **traits.csv** file into that folder.
  2. To start the experiment, click the **'Run'** button (a green circle with a triangle) in the toolbar at the top of PsychoPy.

- Execution:
  At the start, a dialog box appears prompting the participant to enter their ID and the experiment date. After clicking "OK," a data file is automatically generated using the format ‘*ParticipantID_Date_Time’*, and all responses are saved in this file.

  Each trial begins with a target word displayed near the top center of the screen. Below the target word, the condition is shown to guide the participant’s decision. At the bottom of the screen, three choice words are presented, labeled 1, 2, and 3 from left to right. The participant reads the target word and selects the option that best matches the given condition by pressing the corresponding number key (1, 2, 3). There are six conditions-high,low, colour, size, texture, and shape.

  Each condition contains 10 trials, and both the order of the six conditions and the 10

trials within each condition are randomized for each participant.

After the dialog box, a brief instruction screen is presented. This explains the task and tells the participant to press the spacebar to begin or Esc to exit at any time. Upon pressing the spacebar, a fixation cross appears in the center of the screen for 5 seconds.

Next, a short instruction about the upcoming block appears. Then the 10 randomized trials for that condition begin. Each trial lasts up to 10 seconds, ending sooner if the participant responds. After each response, a fixation cross is shown for a random interval between 0.5 and 2.5 seconds before the next trial begins.

After every 10 trials, a break message appears on the screen, lasting for a random interval between 7.5 and 12.5 seconds. This message is designed to help participants refocus before the next condition.

In total, the experiment consists of 60 trials. Once all trials are completed, an end message is shown, and the experiment closes automatically.

- Participant Instructions:
  Each screen presents a total of five words. At the top, you will see the target word. Just below it, a condition is shown to guide your decision. At the bottom of the screen, three choice words are displayed. Your task is to read the target word and, based on the condition, choose the word from the three options that best matches it. Press 1, 2, or 3 on your keyboard to select the word, from left to right. Each trial lasts up to 10 seconds. If you do not respond within this time, the trial will automatically end and move on to the next one. A final message will be shown before the program automatically closes. If you wish to stop the experiment at any time, you can press the Escape key to exit.

Parsing the Outputs

- Output Format(see the Key Data section below for further details):
  1. Par_X_Xdate.csv
  2. combined_results.csv
  3. participant_results.csv
  4. group_results.csv

- Key Data Points:
  1. In each of the CSV files above, the following columns are recorded in order: Condition, Target, Word1, Word2, Word3, Answer, CorrectAnswer, RT (Reaction Time), IsCorrect, Time
  2. combined_results.csv: This file contains the full response records from all participants, merged into one file.
  3. participant_results.csv: This file includes, for each condition, only the trials where each participant selected the correct answer. It records the average reaction time, standard error, and accuracy rate in order.
  4. group_results.csv: This file summarizes trials in which the correct answer was

chosen, grouped by condition. It records the average reaction time, standard error, and accuracy rate for each condition.

Technical Notes and Special Considerations

- Custom Modifications:
  1. Blocks were created based on each condition, and these blocks were randomized in their presentation order.
  2. If the participant did not press a key within 10 seconds, the trial automatically proceeded to the next one, and the response was recorded as NA.
  3. The output file name was generated based on the participant's ID, date, and time.
  4. A random fixation interval (0.5–2.5 seconds) was inserted between trials. After every block of 10 trials (per condition), a longer random fixation interval (7.5–12.5 seconds) was presented along with a break message.

- Potential Issues:
  1. If the code is run on a different operating system than the one it was written on, the file may not open correctly. To prevent this issue, an OS-independent file path was used.

- Extensibility:
  1. Currently, the stimuli are limited to words, but in future studies, this can be expanded by using images instead.