SPATIAL TASK
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In this tutorial, you will learn how to implement the MICA task-based functional MRI battery. This platform has been designed to tap into the different domains of relational memory, namely, episodic memory, semantic memory, and spatial memory. Tasks are python-based, implement a 3-alternative forced choice paradigm, and employ similar visual stimuli across two experimental conditions: easy & difficult. The current tutorial deals with the spatial memory task, known as the conformational shift spatial task (CSST).

In the CSST, the participant must correctly choose an object layout from three options. At each trial, three objects are initially displayed in a specific spatial arrangement and the participant must encode the spatial features of the configuration. This phase of the trial is known as the encoding phase. Immediately after, during the retrieval phase, three separate configurations of the same items are displayed and the participant must select which one corresponds to the original spatial layout shown during encoding. There are 56 trials in total, 28 easy & 28 difficult. Difficulty is based on the level of similarity between options. The more similar the three layouts are, the more difficult it will be to tell them apart, and vice-versa.

All memory tasks are called from a common graphical user interface titled "Instructions".

Step 1:
From the 'micaopen/task-fMRI' directory, open a terminal and call the "Instructions" GUI by typing 'python instructions.py' and pressing 'enter'.

Step 2:
Choose "English". You will be prompted to a new GUI called "Cognitive task", which encompasses the three memory tests that make up the MICA task battery.

Step 3:
To call the spatial task, click "spatial", which will open a GUI called "conformational shift spatial task".

Step 4:
Enter the relevant information in the appropriate boxes. For example, for "session", enter "001"; for "subject name", enter "humbaba"; for "symbol list", enter "demo".

Note: For "symbol list", you have the choice between, "A", "B", and "demo". The demo list is an abridged version of the full task.

Click "OK" to continue.

Step 5:
The instructions will now appear on the screen. Read them carefully and when you are ready to proceed, press either '2', '3', or '4' on your keyboard.

Note: Participants inside the scanner are provided with a button box with 4 buttons, numbered '1', '2', '3', and '4'. Only buttons '2', '3', and '4' are used for the purposes of this task. Thus, when prompted to "Press any button to continue...", participants know that it's either '2', '3', or '4' that must be pressed.

Step 6:
You should now see "waiting for scanner..." on the screen. The program is now waiting for the scanner to send a trigger before commencing. To emulate this trigger, press '5' on your keyboard. The task will now begin. At each trial, you must first encode the spatial arrangement of three items and then recall it by selecting one option out of three choices. To choose the leftmost spatial layout, press '2'; to choose the center layout, press '3'; to choose the rightmost layout, press '4'. Press only one key per trial and simply wait for the next trial to appear.

Note: Should you wish to exit the program before the end of the task, press 'esc' during any fixation screen (i.e., any one of the repeating windows with a '+' in the center).

Step 7:
At the end of the run, you will see the "End of experiment" screen. Press 'space' to exit.

Note: A new folder will have been created in 'micaopen/task-fMRI/tasks/spatial' called 'data'. This folder will contain two corresponding log files for semantic task that was just run: a .log file and a .csv file.

Step 8:
Now that you have successfully completed the spatial task, you can verify how well you performed on it. Open a terminal from the 'micaopen/task-fMRI' directory, type 'python eval.py' and press 'enter'.

Step 9:
Choose "English" and you will be directed to a new GUI titled "Evaluator". Select "spatial".

Step 10:
In the new "Spatial Evaluator" GUI, enter the relevant information. You must ensure that all the information corresponds to what you entered previously at the outset of the spatial task. For this example, for "session", enter "001"; for "subject name", enter "humbaba"; for "symbol list", enter "demo". Click "OK".

Note: A new folder will have been created in 'micaopen/task-fMRI/tasks/spatial' called 'data_score'. This folder will contain a single .csv file, which contains behavioral information, such as performance scores on each condition and various reaction time outputs.