======Participants========

(1) full brain 128-electrodes EEG experiment:

53 participants include a total of 24 outpatients (13 males and 11 females; 18–55-year-old) diagnosed with depression, as well as 29 healthy controls (20 males and 9 females; 18–55-year-old) were recruited;

(2) pervasive 3-electrodes EEG experiment: 55 participants include a total of 26 outpatients (15 males and 11 females; 18–55-year-old) diagnosed with depression, as well as 29 healthy controls (19 males and 10 females; 18–55-year-old) were recruited;

(3) Audio experiment: 52 participants include a total of 23 outpatients (16 males and 7 females; 18–55-year-old) diagnosed with depression, as well as 29 healthy controls (20 males and 9 females; 18–55-year-old) were recruited.

====== Experimental paradigm ===============

full brain 128-electrodes EEG experiment:

The multi-channel EEG was collected in a quiet, sound-proof, well-ventilated room without strong electromagnetic interference. Participants completed the tasks sitting alone in the room, while the operators were monitoring their progress in the adjoining room. When the electrode placement is completed, and the impedance meets the requirements, data acquisition can be started. All participants were asked to complete two tasks: resting state and dot-probe tasks.

Task 1: Resting state

5 minutes of eyes-closed resting-state EEG was recorded. Participants were required to keep awake and still without any bodily movements including heads or legs, as well as any unnecessary eye movements, saccades, and blinks. After completion of Task 1, participants had a rest and then completed Task 2.

Task 2: Dot probe

Participants were seated in front of the monitor (17" monitor, 1280 ×1024 resolution, and 60 Hz refresh rate) at a distance of 60 cm. All relevant instructions were shown on the computer screen initially. Before the experiment began, the participants were instructed to complete the 10 practice trials to get familiar with the task. In the formal experiment, the participants were instructed to focus their attention on the emotional-neutral face pairs with eyes viewing freely. And they were asked to press the button on the reaction box as quickly and accurately as possible when the dot appeared. The participants must press down the button without any bodily movements including heads or legs, as well as any unnecessary eye movements, saccades, and blinks. After completing each block, they would have a rest.

The whole experimental paradigm was programmed by E-prime v2.0 (Psychology Software Tools, Inc., Pittsburgh, PA, USA). The task consisted of three blocks (Fear-Neutral, Sad-Neutral, and Happy-Neutral), and each block had 160 trials. At the beginning of each trial, a fixed white cross appeared on the central screen at 300 ms and lasted for 300 ms from the start. Then, the cross was presented on the screen centrally on the screen throughout the experiment. The emotional-neutral face stimuli pair was presented on the screen as a cue for 500 ms, the pair was arranged in a pseudo-random order. After a short interval from 100–300 ms, the dot-probe appeared randomly as a target on the left or right position of the fixed cross for 150 ms. Concurrently, the participant was asked to identify the spatial location of the ‘dot’ and to record their response by pressing the button ‘1’ or ‘4’ on the reaction box with their index fingers as quickly as possible. If the dot appeared to the left of the fixation cross, the subject should press ‘1’; if the dot appeared to the right of the fixation cross, the subject should press ‘4’. An automatic interval of 2000 ms was used to receive the response of the participant; otherwise, the participant would be directed into the subsequent trial that was followed by a black screen presented for 600 ms. The procedure continued gradually until a block was completed. Each block was also run in a cycle manner until the entire task was finished. The whole experimental task was completed in about 25 min. The cue stimuli include three kinds of emotional-neutral face pairs (Fear-Neutral, Sad-Neutral, and Happy-Neutral). The dot target was presented randomly as a target in either the left or right position of the fixed cross.

pervasive 3-electrodes EEG experiment:

The data recorded in a room without loud noise and strongly magnetic. Participants kept their eyes closed until they were observed their EEG signals were relatively stable, then we started a 90-second data acquisition

Audio experiment:

There are three fixed-order parts: interview, reading, and picture description. The text materials were showed on a computer screen, and the participants were asked to finish the experiment following the instructions.

1) Interview: This task contained 18 questions with positive, neutral and negative meanings. These topics came from DSM-IV and some depression scales which are often used in this field. For example: If you have a vacation, please describe your travel plans. What is your best gift you have ever received and how did you feel? Please describe one of your friends, including age, job, characters, and hobbies. How do you evaluate yourself? What would you like to do when you are unable to fall asleep? What makes you desperate?

2) Reading: This part consists of a short story named “The North Wind and the Sun”, which is from the booklet “The Principles of the International Phonetic Association”, and often used in the acoustic analysis in international, multilingual clinical research. And three groups words with positive (e.g., outstanding, happy), neutral (e.g., center, since) and negative (e.g., depression, wail) emotion. Positive and negative words are selected from affective ontology corpus created by Hongfei Lin, and neutral ones are picked out from Chinese affective words extremum table. All these words are often-used words in Chinese to avoid the impact of educational level and three groups words have close stroke numbers. Subjects are told to read a story, and these words in their common ways.

3) Picture description: The materials for this task include four pictures in all. Three pictures, which express positive, neutral, and negative faces, are selected from Chinese Facial Affective Picture System (CFAPS) and the last one with a “crying woman” came from Thematic Apperception Test (TAT). TAT is created by Murray in 1935, which is used in psychological counseling and psychotherapy at present. In this task, subjects are told to describe these four pictures freely.

====== Data Records ===============

1. Data recording and storage

full brain 128-electrodes EEG experiment:

Task 1: Resting state

Five minutes of eyes-closed resting data were recorded with Net Station acquisition software. The acquired raw data were saved as .mff files on the MAC PC. The data files named with “0201” prefix represent data from patients with MDD, and the data files named with “0203” prefix represent data from NC. Then .mff files were converted to .mat files using the Net Station Waveform Tools.

Task 2: Dot probe

During the experiment, the stimulus computer presented the dot-probe experiment task and recorded the reaction time (RT), accuracy and CellNumber in a .edat file. The data files named with “Dot\_Detection-0201” prefix represent data from patients with MDD, and the data files named with “Dot\_Detection-0203” prefix represent data from NC. The event file can be imported by E-prime. The stimulus computer also sent synchronized triggers to the Net Station acquisition software. Concurrently, the Net Station acquisition software recorded EEG data with the timestamps of triggers. The acquired raw data were saved as .mff files on the MAC PC. The data files named with “0201” prefix represent data from patients with MDD, and the data files named with “0203” prefix represent data from NC. Then .mff files were converted to .raw files using the Net Station Waveform Tools.

For the two experimental tasks, EEG signals were obtained using the HydroCel Geodesic Sensor Net (HCGSN) (Electrical Geodesics Inc., Oregon Eugene, USA). Recorded EEG signals were collected using a wired EEG cap with 128-Ag/AgCl electrodes. The contact impedance between all electrodes and the skin was kept below 50 kΩ. The EEG recordings were amplified by the Electrical Geodesics amplifiers and digitized at 250 Hz. Net Station acquisition software 4.5.4 is the ultimate tool for data acquisition.

The data are stored in folders by task, name as “128-channel\_RestingState” and “128-channel\_DotProbe,” respectively. One file per subject.

pervasive 3-electrodes EEG experiment:

Considering that the prefrontal lobe has a strong correlation with emotional processes and psychiatric disorders, we collected the EEG signal by three-electrode. pervasive EEG collection device which has three electrodes located on the prefrontal lobe (Fp1, Fpz, and Fp2). The location of the three electrodes placement (Fp1, Fpz, and Fp2) .

Collected data files were stored in a referential montage using an open-source TXT format. Each TXT is an M by N array, M is the number of electrodes (M = 8), and N is the number of all sample dots. What needs to be explained here is the first three electrodes correspond to the Fp1 electrode, Fpz electrode, Fp2 electrode, and the last five electrodes are alternate channel data which is the default value if not be used.

Audio experiment:

We collected data in a quiet, clean, soundproof, and no electromagnetic interference room. During the experiment, the ambient noise of lab must be less than 60dB. The devices we used for recording are Neumann TLM102 (microphones) and RME FIREFACE UCX (audio card) with a 44.1 kHz sampling rate and 24-bit sampling depth. All recording data were saved as uncompressed WAV format.

All the recordings were segmented and labeled manually, and only participants’ speech was kept. There were 29 recordings (interview (18), passage reading (1), word reading (6) and picture description (4)) for each subject.

2. 3-electrodes EEG signals

During processing, we converted the raw hex data of the first three columns to decimal data first. Then, the signal was filtered by 1Hz high-pass and 45Hz low-pass finite impulse response (FIR) filter. Next, we use an adaptive noise canceller to remove the eye-blink artifacts. Figure 4 shows the signal waveform in real-time after preprocessing.

3. Whole-brain EEG signals

Task 1: Resting state

The raw files were read using the EEGLAB toolbox in MATLAB. The uploaded files named with mat suffixes contain all the signals. After loading the files, the “EEG.data” variable included 129 EEG signals. The first 128 signals were from the electrode E1 to electrode E128. The last signal from Cz was the reference electrode.

Task 2: Dot probe

The raw files were read using the EEGLAB toolbox in MATLAB. The uploaded files named with raw suffixes contain all the signals. After loading the files, the “EEG.data” variable included 128 EEG signals. The 128 signals were from the electrode E1 to electrode E128. Additionally, the types of events (see “EEG.event.type”) in the dataset were classified as fixation onset (mark: hfix or ffix or sfix), cue onset (mark: hcue or fcue or scue), interval onset (mark: hisi or fisi or sisi), target onset (mark: hdot or fdot or sdot) and response onset (mark: hwrp or fwrp or swrp).

4. Audio

In the experiment, 29 recordings for every single participant were stored and named as 1 to 29 in a determined sequence. The details were as follows: The positive, neutral, and negative interview recordings are named as 1-6, 7-12 and 13-18 separately. The record of the short story is named as 19. The readings of six-word groups are named as 20-21, 22-23 and 24-25 in accordance with the sequence of positive, neutral and negative emotion. 26-28 were the picture description with the same order to the reading part. The record of TAT was numbered as 29.