# MEG/EEG Data for Verbal-interaction Hyperscanning Task

Contact: Kyungho Won (kyunghowon0712@gist.ac.kr)

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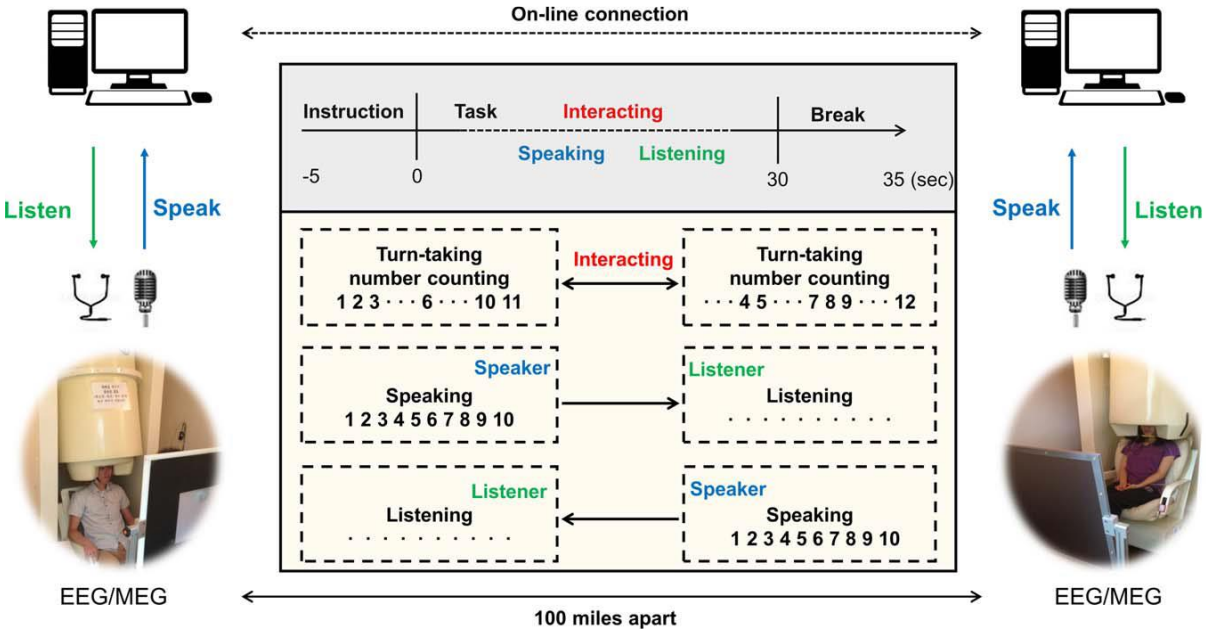
## Experimental paradigm

Ten healthy subjects with normal or corrected-to-normal vision and no history of neurological disease participated in this study (five pairs, age 23.9±3.3, none was aware of any personal information). Each pair was assigned to one of these two different sites; either the Yonsei Severance Hospital or the Korea Research Institute of Standards and Science. All subjects signed a consent form describing the detailed experimental procedure and received approximately $15 per hour for their participation. The purposes of and instructions for the experiment were explained clearly to all the subjects prior to recording. This study was approved by the Institutional Review Board at Gwangju Institute of Science and Technology (20150615-HR-18-02-03).




Each subject sat in a magnetically and electrically shielded room and visual instructions were displayed on a screen ~100 cm from them. A trial lasted 40 s, including 5 s instruction and break periods before and after the task, as depicted in Figure 1 (top gray box). For the first 5

s, visual instructions appeared on the screen in yellow characters on a black background, and the subjects prepared to perform the given task. After the instruction period, the task period began with a blank black screen that lasted 30 s to eliminate any visual input. The experiment included three tasks: interacting, speaking and listening.

——————————— Interacting task

Each subject was instructed to perform turn-taking number counting beginning with the number 1; they counted the numbers consecutively and verbally for only 30 s. One subject (initiator) began by saying the number 1, and the other subject (partner) then spoke the numbers that follow. Rules of the turn-taking task were that each subject could count at most three consecutive numbers during one turn, and a partner could say the following consecutive number followed by the numbers, which the initiator counted during a previous turn. However, the partner could not say the same number as that counted by the initiator. For example, if an initiator counted three consecutive numbers 1–2-3, then a partner must count 4, or 4–5, but could not count 4–5-6. This rule is expected to keep subjects attentive in that the subjects were asked to focus on the task continuously and encourage active interactions during turn-taking situation. If they were allowed to say the numbers arbitrarily without this rule, they might say numbers instinctively without regard to numbers that the partner said in a previous turn. Finally, the initiator of the task changed continuously by turns.

——————————— Speaking task

Each subject counted numbers without stopping for 30 s, beginning with 1. Subjects could not listen to the voice of their partners and simply spoke alone during this period. This task was designed as a non-interaction/control task. Each subject spoke numbers, but there was no interaction between the two.

——————————— Listening task

Each subject listened naturally to his/her partner's number counting without responding. Subjects were instructed to keep their eyes open while they listened. Subjects performed the three different tasks repeatedly in a regular sequence. After the task period, there was a 5 s break, during which the subjects stopped counting and prepared for the next instructions. The task consisted of 18 trials (6 trials for each of the 3 tasks) per run, and 5 viable runs were conducted; thus, a total of 90 trials (30 trials per task) was obtained. If a subject made a mistake during the task, the partner was instructed to raise his/her hand to stop the trial until the break period.

## Data recording

All subjects were engaged in the task in two shielded rooms. Magnetic-compatible, custom-built EEG electrodes were attached to the scalp. Brain Products and Biosemi EEG amplifiers were used to record electrical activities for each subject with a 1,024 Hz sampling rate. Nineteen EEG electrodes were attached over the entire scalp (Fp1, Fp2, F3, F4, C3, C4, P3, P4, O1, O2, F7, F8, T3, T4, T5, T6, Fz, Cz, Pz) based on the 10–20 international position system. Common mode sense (CMS) and driven right leg (DRL) electrodes were

used for reference and formed a feedback loop to drive the average potential of the subject. This is known as CMS-DRL referencing (www.biosemi.com). Vertical and horizontal

EOG were attached around the eyes with two ECGs around the collarbone. Two MEG measurement systems were installed in two different sites, using the 152-sensor, wholehead configuration at a 1,024 Hz sampling rate developed by the Korea Research Institute of Standards and Science [Lee et al., 2009]. The sensors were first-order axial gradiometers with a baseline of 5 cm.

## Data file description

s1, s3, s5, s7, s9_eeg: EEG data from Severance Hospital

- eeg.data: channel x time EEG data
- eeg.marker: triggers
- eeg.n_trials: # of trials
- eeg.srate: sampling rate
- eeg.senloc: digitized locations
- eeg.rest: resting state EEG data
- eeg.label: channel labels
- eeg.des: description for triggers

s1, s3, s5, s7, s9_meg: MEG data from Severance Hospital

- meg.ntrials: # of trials
- meg.srate: sampling rate
- meg.event: triggers
- meg.excluded_ch: off channels
- meg.label: channel labels
- meg.des: description for triggers
- meg.data: channel x time MEG data

s2, s4, s6, s8, s10_eeg: EEG data from KRISS

- eeg.label: channel labels
- eeg.srate: sampling rate
- eeg.n_trials: # of trials
- eeg.rest: resting state EEG data
- eeg.data: channel x time EEG data
- eeg.marker: triggers
- eeg.des: description for triggers
- eeg.senloc: digitized locations
- eeg.senloc_label: labels for digitized locations

s2, s4, s6, s8, s10_meg: MEG data from KRISS

- meg.des: description for triggers
- meg.label: channel labels
- meg.srate: sampling rate
- meg.n_trials: # of trials
- meg.rest: resting state MEG data
- meg.data: channel x time MEG data
- meg.event: triggers
- meg.senloc: sensor locations