Sustained attention to a task lapses often, even in scenarios like reading where focus is important [5]. A clear picture of the neural processes involved in sustained attention could help illuminate disorders of attention (e.g., ADHD), but studies of sustained attention lack an objective, continuous metric that is valid for a naturalistic task. We leverage recent work showing the predictive potential of functional connectivity [FC] in classifying cognitive state [2]. We extract both fMRI magnitude and FC features in a task where subjects split their attention between reading and auditory distractions, and we use these features to identify the presence of, and attention to, these distractions.

**METHODS**

**acquisition parameters**

**data collection**

1. GE T:15 M:70 MRI scanner, GE:32-channel head coil, GRE EPI, TR = 2 s, TE = 14 ± 6/26.85/9.0 ms, FA = 77°, 37 oblique slices, 3x3x3.5 mm voxels, 1mm gap, 72x72 grid, ASSET=8, 100mL PM:90 T-weighted and PD-weighted scans were collected during each session for pre-processing.

**preprocessing**

Data from 21 healthy adults (20-42 years old, 14 females, 1 left-handed). Up to five scans were collected based on time. Down-sampling, slice time correction, motion, and registration were applied. Alignment and motion correction parameters were calculated on Echal and applied to all other scans. Midline-Echo Independent Component Analysis (MICA) [3] was performed to remove IC components with low-BOLD-like weighting across subjects. Motion, motion derivatives, intensity, polynomials, and band-pass filters (0.01-0.1 Hz) were regressed out of the data. 2 subjects with > 4 runs and 6 subjects with excessive motion were excluded from further analysis.

**feature extraction**

**first half of run**

**second half of run**

**comprehension questions**

**classification**

**accuracy**

**response time**

**CONCLUSIONS**

While Magnitude features were more predictive of the external stimulus, FC better predicted attentional state, perhaps because this process involves subtler interactions between more widely distributed brain regions. This suggests that FC patterns may provide an effective metric of sustained attention in naturalistic tasks.

**REFERENCES**


**FMRI Connectivity Outperforms Magnitude in Classifying Attention to Distracting Speech While Reading**

David C. Jangraw, Daniel A. Handwerker, Jonis Gonzalez-Castillo, Poju Pawan, Velastinez Zarichanes, Peter A. Bandettini (1)