GSP Open Access Documentation

Brain Genomics Superstruct Project

June 30th, 2014

CONTENTS

Part I

Frequently Asked Questions

What data are included within the GSP Open Access data release?

MRI data from 1570 unique subjects are included (ages 18-35). Each dataset has one high-resolution anatomical image (Dataverse, ANAT; LONI, T1_MEMPRAGE_RMS) and at least one eyes-open rest functional MRI run (BOLD). 1139 of the 1570 datasets include two BOLD runs. The imaging data are provided in NIfTI format.

Demographic data are included on all subjects (age, handedness, sex, etc) and cognitive/behavioral data are included for 926 subjects. A CSV file (GSP_list_140630.csv) contains the demographic and cognitive/behavioral data.

What data are included within the *extended* GSP Open Access data release?

The extended data release includes one additional CSV file (GSP_extended_140630.csv) containing additional phenotypes (e.g., EstIQ_Matrix_Int_Bin) for a subset of subjects.

The extended release is available for download through the LONI Image Data Archive following submission of the GSP Restricted Access Data Use Terms.

How are the data organized on Dataverse?

The imaging data are provided in subject-specific folders (e.g., Sub0001_Ses1). These unique subject folders are bundled into 10 separate tar files (each with 157 subjects). A single CSV file (GSP_list_140630.csv) contains the demographic and cognitive/behavioral data.

For help downloading the files, refer to the video tutorials on the Harvard Neuroinformatics Research Group website.

How are the data organized within the LONI Image Data Archive?

The downloaded files are stored in a specific folder hierarchy e.g., GSP > Sub0001_S1 > BOLD1 > 2014-06-30_00_00_00.0 > S237949 > GSP_Sub0001_S1_MR_BOLD1_Br_20150406152938366_S237949_I482691.nii. The imaging data can be downloaded individually or in bulk.

A single CSV file (GSP_list_140630.csv) containing the demographic and cognitive/behavioral data can be downloaded from the Download Study Data page using the Demographic and Behavioral Data link.

A single extended CSV file (GSP_extended_140630.csv) containing additional phenotypes can be downloaded using the Demographic and Behavioral Data Extended link.

For help downloading the files, refer to the video tutorials on the Harvard Neuroinformatics Research Group website.

Are there test-retest reliability data?

Yes. In addition to the 1570 unique subject datasets, there are 69 subjects who were scanned on two separate occasions. These MRI data are provided as a test-retest data set for development of methods. A separate CSV file (GSP_retest_140630.csv) contains metadata for these test-retest sessions.

On Dataverse, the test-retest data are contained within their own separate tar file (GSP_retest_140630.tar) and not within the 10 main tar files of unique subjects.

What are the image file orientations?

The anatomical images (Dataverse, ANAT; LONI, T1_MEMPRAGE_RMS) are stored in Anterior-to-Posterior (x), Superior-to-Inferior (y), Right-to-Left (z) orientation. The BOLD images are stored in Right-to-Left (x), Anterior-to-Posterior (y), Inferior-to-Superior (z) orientation.

What is the coverage and slice ordering for the BOLD runs?

The BOLD protocol has 47 interleaved slices covering the whole brain including the full cerebellum (TR = 3 sec, 3 mm isotropic voxels, no skip between slices). The slices are acquired ascending (foot - head). Odd numbered slices are acquired first, then even numbered slices so the order is: 1, 3, 5, ... 45, 47, 2, 4, 6 .... 44, 46. The exact slice timing can be found in the BOLD DICOM Header Reference element (0019, 1029).

Should I discard any timepoints at the beginning of the BOLD runs?

Yes. There are 124 image volumes in each BOLD run. These include initial images before T1-stabilization is reached. We recommend discarding the first 4 image volumes and analyzing the remaining 120 timepoints.

What are the anatomy (Dataverse, ANAT; LONI, T1_MEMPRAGE_RMS) images?

The structural images are T1-weighted Multi-Echo MPRAGE (ME-MPRAGE) images that are 1.2 mm isotropic resolution (see van der Kouwe et al., 2008 *NeuroImage*). The single image file contained in the release is the root mean square (RMS) average of the four echoes that were acquired and, for most purposes, can be analyzed as a standard structural T1-weighted image.

Are the image files processed in anyway?

Yes. In addition to conversion to NIfTI format from DICOM, the face of each high-resolution file (Dataverse, ANAT; LONI, T1_MEMPRAGE_RMS) is blurred using the mask_face software developed at Washington University in St. Louis (Milchenko and Marcus, 2013 *Neuroinformatics*).

We have observed that defacing has small effects on quantitative values such as output from morphometric analysis tools like FreeSurfer. To facilitate analysis, the CSV files (GSP_list_140630.csv and GSP_retest_140630.csv) include select morphometric values that were computed prior to defacing using FreeSurfer 4.5.0 (as used in Holmes et al., 2013 *J Neurosci*). Individuals computing such values on the defaced images provided in this release can expect highly correlated (but slightly different) values. It should also be noted that in our analysis we used a custom target, different from the default targets available in FreeSurfer, built from our ME-MPRAGE data. This ensured appropriate, matched contrast.

Are all of the data acquired exactly the same?

Pretty close. All imaging datasets were captured on matched Siemens 3T MAGNETOM Tim Trio MRI systems (Erlangen, Germany) using the vendor-supplied 12-channel phase-array head coil. The exact same sequences, parameters, and instructions were used. But not all subjects were acquired on the same scanner. Five different scanners were used to acquire data. In addition, during the scanning period, the scanner console changed from B13 to B15 to B17.

The scanner (Scanner_Bin) and console version (Console) for each imaging session are available within the CSV files (GSP_list_140630.csv and GSP_retest_140630.csv).

The test-retest data include individuals scanned twice on the different scanners and across different console versions. These data may be helpful in assessing any differences that are typically not detectable or minor. As a precaution we recommend regressing scanner and console from analyses.

How are ages and IQ estimates coded?

To protect identity, ages are reported to the nearest age bin. For example, the Age_Bin 19 includes individuals age 18 and age 19 at the time of the scan.

Estimated IQ scores are binned to the nearest IQ bin. For example, EstIQ_Shipley_Int_Bin 125 includes individuals with an estimated Shipley IQ of 124 and 125.

I can't find all of the phenotypes listed in the Phenotypes Legend?

Several phenotypes, those listed in italics in the Phenotypes Legend list, are available in a separate extended CSV file (GSP_extended_140630.csv) on the LONI Image Data Archive. You must submit the GSP Restricted Access Data Use Terms application to request access to this file.

Are there genetic data?

Yes. DNA via saliva was collected for almost all of the participants. The genetic data are planned for release in the future.

How should I acknowledge the data in my papers?

No members of the GSP team nor the byline "GSP" should be included as an author on a paper solely because these data are used.

Papers that include results using GSP data should add the following section to the acknowledgements "Data were provided [in part] by the Brain Genomics Superstruct Project of Harvard University and the Massachusetts General Hospital, (Principal Investigators: Randy Buckner, Joshua Roffman, and Jordan Smoller), with support from the Center for Brain Science Neuroinformatics Research Group, the Athinoula A. Martinos Center for Biomedical Imaging, and

the Center for Human Genetic Research. 20 individual investigators at Harvard and MGH generously contributed data to the overall project."

A paper describing the data is in process. Once that paper is published, it would be appropriate to cite the paper in the methods section.

How did the name GSP arise?

GSP is short for Brain Genomics Superstruct Project. The name comes from the fact that the project was conceived as an add-on to existing research studies already taking place on matched MRI scanners in the Boston area. The name comes from the word 'superstruct' which means "to erect upon a foundation."

Who designed the GSP logo?

The GSP logo was designed by a talented local artist and designer, Julie Beck.

Some useful references

Holmes AJ, Lee PH, Hollinshead M, Bakst L, Roffman JL, Smoller JW, Buckner RL (2012) Individual differences in amygdala-prefrontal anatomy link negative affect, impaired social functioning, and polygenetic depression risk. *J Neurosci*, 32: 18087-100.

Milchenko M, Marcus D (2013) Obscuring surface anatomy in volumetric imaging data. *Neuroinformatics*, 11:65-75.

van der Kouwe AJ, Benner T, Salat DH, Fischl B (2008) Brain morphometry with multiecho MPRAGE. *NeuroImage* 40: 559-69.

Yeo BT, Krienen FM, Sepulcre J, Sabuncu MR, Lashkari D, Hollinshead M, Roffman JL, Smoller JW, Zollei L, Polimeni JR, Fischl B, Liu H, Buckner RL (2011) The organization of the human cerebral cortex estimated by intrinsic functional connectivity. *J Neurophysiol*, 106: 1125-65.

Part II

Dataverse Release File List

The imaging data are stored in 10 separate tar files, each containing 157 subjects. There is a single description .csv file that contains the demographic and phenotype data for all 1570 unique subjects. All 10 tar files must be downloaded to obtain the full n=1570 dataset.

File Name	Size	Subject Range	Sample
GSP_list_140630.csv	<1 MB	Sub0001_Ses1 to Sub1570_Ses1	n=1570
GSP_part1_140630.tar	11 GB	Sub0001_Ses1 to Sub0157_Ses1	n=157
GSP_part2_140630.tar	11 GB	Sub0158_Ses1 to Sub0314_Ses1	n=157
GSP_part3_140630.tar	11 GB	Sub0315_Ses1 to Sub0471_Ses1	n=157
GSP_part4_140630.tar	10 GB	Sub0472_Ses1 to Sub0628_Ses1	n=157
GSP_part5_140630.tar	10 GB	Sub0629_Ses1 to Sub0785_Ses1	n=157
GSP_part6_140630.tar	11 GB	Sub0786_Ses1 to Sub0942_Ses1	n=157
GSP_part7_140630.tar	11 GB	Sub0943_Ses1 to Sub1099_Ses1	n=157
GSP_part8_140630.tar	10 GB	Sub1100_Ses1 to Sub1256_Ses1	n=157
GSP_part9_140630.tar	11 GB	Sub1257_Ses1 to Sub1413_Ses1	n=157
GSP_part10_140630.tar	10 GB	Sub1414_Ses1 to Sub1570_Ses1	n=157

The test-retest imaging data are stored in a single tar file that contains both sessions for each of the 69 test-retest subjects (the Ses1 image sets are the same as those included in the full dataset release above). There is a single description .csv file for the 69 test-retest subjects. Downloading the single retest tar file contains all of the data needed for analysis of reliability.

File Name	Size	Subject Range	Sample
GSP_retest_140630.csv	<1 MB	Sub0043_Ses1 to Sub1562_Ses1 Sub0043_Ses2 to Sub1562_Ses2	n=69
GSP_retest_140630.tar	9 GB	Sub0043_Ses1 to Sub1562_Ses1 Sub0043_Ses2 to Sub1562_Ses2	n=69

Part III

LONI Release File List

The imaging data for each subject are stored individually. There is a single description .csv file that contains the demographic and phenotype data for all 1570 unique subjects and a separate extended .csv file that contains additional phenotypes for a subset of subjects.

File Name	Size	Subject Range	Sample
GSP_list_140630.csv	<1 MB	Sub0001_S1 to Sub1570_S1	n=1570
GSP_extended_140630.csv	<1 MB	Sub0001_S1 to Sub1570_S1	n=1570
GSP_Sub*_S1_MR_BOLD1_*.nii	<60 MB	Sub0001_S1 to Sub1570_S1	n=1570
GSP_Sub*_S1_MR_BOLD2_*.nii	<60 MB	Sub0001_S1 to Sub1570_S1	n=1570
GSP_Sub*_S1_MR_T1_MEMPRAGE_RMS_*.nii	<11 MB	Sub0001_S1 to Sub1570_S1	n=1570

The retest (S2) imaging data are stored individually for each of the 69 test-retest subjects. There is a single description .csv file for the 69 test-retest subjects.

File Name	Size	Subject Range	Sample
GSP_retest_140630.csv	<1 MB	Sub0043_S1 to Sub1562_S1 Sub0043_S2 to Sub1562_S2	n=69
GSP_Sub*_S2_MR_BOLD1_*.nii	<60 MB	Sub0001_S2 to Sub1570_S2	n=69
GSP_Sub*_S2_MR_BOLD2_*.nii	<60 MB	Sub0001_S2 to Sub1570_S2	n=69
GSP_Sub*_S2_MR_T1_MEMPRAGE_RMS_*.nii	<11 MB	Sub0001_S2 to Sub1570_S2	n=69

Part IV

Phenotypes Legend

Phenotype	Description
Subject_ID	The anonymous data release ID.
Delay	The number of days between the test and retest scans.
Subject_Rescan_ID	The anonymous data release ID for subjects who were re-scanned within six months of their initial scan date.
MRI	Reflects the number of eyes open rest runs available (1, 2).
Behavior	Reflects the presence of behavioral data (Present, Absent).
Sex	Sex (M, F).
Age_Bin	The binned age (2 year bins) of each participant at the time of image acquisition. Participants who were from 18-19 years of age at the point of scan are coded as 19, participants who were 20-21 years of age are coded as 21, etc.
Hand	Participant handedness (RHT, LFT, AMB).
Educ	Years of education. Please note, due to the characteristics of the sample education is truncated by the age of the participant and should not be interpreted as an accurate reflection (nor a proxy) of SES.
Race_Ethn	Participant race/ethnicity (White not Hispanic = W_NOT_HL, all other race/ethnicities = Other).
Scanner_Bin	Site/Scanner bay where the data were acquired (A, B, C, D, E).
Console	Console software version on scanner at the time of image acquisition (B13, B15, B17).
Coil	Coil version (currently all 12-channel coils = Tim_12).
ANAT	The run number for the T1 MEMPRAGE anatomical scan (1).
BOLD1	The run number for the first eyes open rest run (2).
BOLD1_sSNR	Slice based SNR for first eyes open rest run.
BOLD1_MotMicro	Number of relative translations in 3D space $\geq$ 0.1mm.
BOLD1_MotAbsMax	Maximum absolute translation in 3D space (mm).
BOLD2	The run number for the second eyes open rest run when present (3).
BOLD2_sSNR	Slice based SNR for second eyes open rest run.
BOLD2_MotMicro	Number of relative translations in 3D space $\geq$ 0.1mm.
BOLD2_MotAbsMax	Maximum absolute translation in 3D space (mm).
Flank_S_CORRpc	The percentage of correct responses for the flanker task during switch blocks.
Flank_S_meanRTcorr	The mean reaction time (RT) for correct flanker task trials during switch blocks.
Flank_S_medRTcorr	The median RT for correct flanker task trials during switch blocks.
Flank_S_score	The number of correct trials minus the number of incorrect trials for the switch blocks.

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Table 1 – continued from previous page

Phenotype	Description
Flank_NS_CORRpc	The percentage of correct responses for the flanker task during non-switch blocks.
Flank_NS_meanRTcorr	The mean RT for the correct flanker task trials during non-switch blocks.
Flank_NS_medRTcorr	The median RT for the correct flanker task trials during the non-switch blocks.
Flank_NS_score	The number of correct trials minus the number of incorrect trials for the non-switch blocks.
Flank_CORRpc	The percent of correct responses for the flanker task.
Flank_meanRTcorr	The mean flanker task RT for correct responses.
Flank_medRTcorr	The median flanker task RT for correct responses.
Flank_TOT_score	The number of correct trials minus the number of incorrect trials for the flanker task.
MenRot_0_CORRpc	Percent of correct responses for mental rotation 0-degree rotation trials.
MenRot_0_meanRTcorr	Mean RT of correct responses for mental rotation 0-degree rotation trials.
MenRot_0_medRTcorr	Median RT of correct responses for mental rotation 0-degree rotation trials.
MenRot_80_CORRpc	Percent of correct responses for mental rotation 80-degree rotation trials.
MenRot_80_meanRTcorr	Mean RT of correct responses for mental rotation 80-degree rotation trials.
MenRot_80_medRTcorr	Median RT of correct responses for mental rotation 80-degree rotation trials.
MenRot_120_CORRpc	Percent of correct responses for mental rotation 120-degree rotation trials.
MenRot_120_meanRTcorr	Mean RT of correct responses for mental rotation 120-degree rotation trials.
MenRot_120_medRTcorr	Median RT of correct responses for mental rotation 120-degree rotation trials.
MenRot_160_CORRpc	Mental rotation percent of correct responses for 160-degree rotation trials.
MenRot_160_meanRTcorr	Mean RT of correct responses for mental rotation 160-degree rotation trials.
MenRot_160_medRTcorr	Median RT of correct responses for mental rotation 160-degree rotation trials.
MenRot_TOT_CORRpc	Percent of correct responses for mental rotation task.
MenRot_TOT_meanRTcorr	Mean RT of correct responses for mental rotation task.
MenRot_TOT_medRTcorr	Median RT of correct responses for mental rotation task.
ICV	Estimated total intracranial volume (mm^3; Buckner et al., 2004).
BrainSegVol	The volume of brain as the sum of the volumes of the segmentations that are in the brain.
BrainSegVolNonVent	The volume of brain as the sum of the volumes of the segmentations that are in the brain excluding the ventricles.

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Table 1 – continued from previous page

Phenotype	Description
postCorCall_Vol	Posterior corpus callosum (mm^3).
midpostCorCall_Vol	Middle posterior corpus callosum (mm^3).
centCorCall_Vol	Central corpus callosum (mm^3).
midantCorCall_Vol	Middle anterior corpus callosum (mm^3).
antCorCall_Vol	Anterior corpus callosum (mm^3).
R_AvgCortThick	Right hemisphere average cortical thickness (mm).
L_AvgCortThick	Left hemisphere average cortical thickness (mm).
R_TotCortSurfArea	Right hemisphere total cortical surface area (mm^2).
L_TotCortSurfArea	Left hemisphere total cortical surface area (mm^2).
R_Amy_Vol	Right hemisphere amygdala volume (mm^3).
L_Amy_Vol	Left hemisphere amygdala volume (mm^3).
R_Hipp_Vol	Right hemisphere hippocampal volume (mm^3).
L_Hipp_Vol	Left hemisphere hippocampal volume (mm^3).
R_rACC_Thick	Right hemisphere rostral anterior cingulate cortical thickness (mm).
L_rACC_Thick	Left hemisphere rostral anterior cingulate cortical thickness (mm).
R_cMF_Thick	Right hemisphere caudal middle frontal cortical thickness (mm).
L_cMF_Thick	Left hemisphere caudal middle frontal cortical thickness (mm).
R_lOcc_Thick	Right hemisphere lateral occipital thickness (mm).
L_lOcc_Thick	Left hemisphere lateral occipital thickness (mm).
R_lingual_Thick	Right hemisphere lingual thickness (mm).
L_lingual_Thick	Left hemisphere lingual thickness (mm).
R_cACC_Thick	Right caudal anterior cingulate thickness (mm).
L_cACC_Thick	Left caudal anterior cingulate thickness (mm).
R_PCC_Thick	Right posterior cingulate thickness (mm).
L_PCC_Thick	Left posterior cingulate thickness (mm).
R_isthmusACC_Thick	Right isthmus cingulate thickness (mm).
L_isthmusACC_Thick	Left isthmus cingulate thickness (mm).
R_Parahipp_Thick	Right parahippocampal thickness (mm).
L_Parahipp_Thick	Left parahippocampal thickness (mm).
R_Fform_Thick	Right fusiform thickness (mm).
L_Fform_Thick	Left fusiform thickness (mm).
R_supF_Thick	Right superiorfrontal thickness (mm).

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Table 1 – continued from previous page

Phenotype	Description
L_supF_Thick	Left superiorfrontal thickness (mm).
R_iPar_Thick	Right inferiorparietal thickness (mm).
L_iPar_Thick	Left inferiorparietal thickness (mm).
R_Ins_Thick	Right insula thickness (mm).
L_Ins_Thick	Left insula thickness (mm).
Health_Rating	Compared to other people how would you rate your physical health? (1 – much worse than average; 2 – worse than average; 3 – average; 4 – better than average; 5 – much better than average).
Health_Satisfy	How satisfied are you with your present health? (1 – not at all satisfied; 2 – not very satisfied; 3 – neither satisfied nor dissatisfies; 4 – somewhat satisfied; 5 – extremely satisfied).
STAI_tAnxiety	State-trait anxiety inventory for adults; Measure of trait anxiety (Score range 20-80; Spielberger and Gorsuch, 1970).
STAI_sAnxiety	State-trait anxiety inventory for adults; Measure of state anxiety (Score range 20-80).
NEO_N	The NEO Five-factor model of personality; Neuroticism score (Score range 0-48; Costa and McCrae, 1992).
NEO_E	The NEO Five-factor model of personality; Extraversion score (Score range 0-48).
NEO_O	The NEO Five-factor model of personality; Openness score (Score range 0-48).
NEO_A	The NEO Five-factor model of personality; Agreeableness score (Score range 0-48).
NEO_C	The NEO Five-factor model of personality; Conscientiousness score (Score range 0-48).
BISBAS_BAS_Drive	Behavioral inhibition (BIS) and behavioral activation (BAS) scale; BAS drive score (Score range 4-16; Carver and White, 1994).
BISBAS_BAS_Fun	Behavioral inhibition (BIS) and behavioral activation (BAS) scale; BAS funseeking score (Score range 4-16).
BISBAS_BAS_Reward	Behavioral inhibition (BIS) and behavioral activation (BAS) scale; BAS reward score (Score range 5-20).
BISBAS_BIS	Behavioral inhibition (BIS) and behavioral activation (BAS) scale; BIS score (Score range 7-28).
MindWandering_Freq	Imaginal process inventory; 12-question mind wandering subscale (Score range 12-60; Singer and Antrobus, 1970)
Barratt_tot	Barratt Impulsivity Scale; Total score (Score range 30-120; Patton et al., 1995).

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Table 1 – continued from previous page

Phenotype	Description
Barratt_2atten	Barratt Impulsivity Scale; 2nd order attentional impulsiveness factor (Score range 8-32).
Barratt_2mot	Barratt Impulsivity Scale; 2nd order motor factor (Score range 11-44).
Barratt_2nonplan	Barratt Impulsivity Scale; 2nd order non-planning factor (Score range 11-44).
Barratt_1atten	Barratt Impulsivity Scale; 1st order attentional factor (Score range 5-20).
Barratt_1mot	Barratt Impulsivity Scale; 1st order motor factor (Score range 7-28).
Barratt_1selfcontrol	Barratt Impulsivity Scale; 1st order self-control factor (Score range 6-24).
Barratt_1complex	Barratt Impulsivity Scale; 1st order cognitive complexity factor (Score range 5-20).
Barratt_1persever	Barratt Impulsivity Scale; 1st order perseverance factor (Score range 4-16).
Barratt_1instability	Barratt Impulsivity Scale; 1st order cognitive instability factor (Score range 3-12).
DOSPERT_taking	Domain-specific risk-tasking scale; Risk taking (Score range 40-280; Weber et al., 2002).
DOSPERT_perception	Domain-specific risk-tasking scale; Risk perception (Score range 40-280).
POMS_TotMdDisturb	Profile of Mood States; Total Mood Disturbance score (Score range -20-100; McNair et al., 1971).
POMS_T_TensionAnxiety	Profile of Mood States; T-score Tension/Anxiety (Score range 30-67).
POMS_T_DepressionDejection	Profile of Mood States; T-score Depression/Dejection (Score range 32-69).
POMS_T_AngerHostility	Profile of Mood States; T-score Anger/Hostility (Score range 36-76).
POMS_T_VigorActivity	Profile of Mood States; T-score Vigor/Activity (Score range 36-80).
POMS_T_FatigueInertia	Profile of Mood States; T-score Fatigue/Inertia (Score range 30-76).
POMS_T_ConfusionBewilderment	Profile of Mood States; T-score Confusion/Bewilderment (Score range 33-75).
TCI_Novelty	Temperament and Character Inventory (TCI-9); Novelty-seeking (Score range 20-100; Cloninger, 1987).
TCI_RewardDependence	Temperament and Character Inventory (TCI-9); Reward Dependence (Score range 20-100).
TCI_HarmAvoidance	Temperament and Character Inventory (TCI-9); Harm Avoidance (Score range 20-100).
Shipley_Vocab_Raw	Raw number correct for the Shipley vocabulary task (Score range 0-40).
EstIQ_Shipley_Int_Bin	Estimated IQ derived from Shipley-Hartford Age-Corrected T-Scores. Reported values are in integers and binned.

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Table 1 – continued from previous page

Phenotype	Description
Matrix_WAIS	Matrix reasoning Wechsler Adult Intelligence Scale (WAIS) score. Scoring rules are as follows: 1. Examinee receives 1 point for each correct response. 2. If the examinee obtains perfect scores on items 4 and 5, give full credit for items 1-3. 3. Discontinue after 4 consecutive errors or 4 errors on five consecutive trials. 4. Count trials with RT $<$ 300ms as errors.
EstIQ_Matrix_Int_Bin	Estimated IQ derived through the OPIE3 formula (Schoenberg et al., 2002). Reported values are in integers and binned.

Part V

MEMPRAGE Protocol Reference

SIEMENS MAGNETOM TrioTim syngo MR B17

\\USER\Investigators\CAP_Matrix\CAP_Full\T1_MEMPRAGE

TA: 2:12 PAT: 4 Voxel size: 1.2×1.2×1.2 mm Rel. SNR: 1.00 USER: Andre\tfl_mgh_multiecho

Properties

Prio Recon	Off
Before measurement	
After measurement	
Load to viewer	On
Inline movie	Off
Auto store images	On
Load to stamp segments	On
Load images to graphic segments	Off
Auto open inline display	Off
Start measurement without further preparation	Off
Wait for user to start	Off
Start measurements	single

Routine

Slab group 1	
Slabs	1
Dist. factor	50 %
Position	R3.0 A12.0 F18.0
Orientation	Sagittal
Phase enc. dir.	A >> P
Rotation	12.50 deg
Phase oversampling	0 %
Slice oversampling	0.0 %
Slices per slab	144
FoV read	230 mm
FoV phase	100.0 %
Slice thickness	1.20 mm
TR	2200 ms
TE 1	1.54 ms
TE 2	3.36 ms
TE 3	5.18 ms
TE 4	7 ms
Averages	1
Concatenations	1
Filter	Prescan Normalize
Coil elements	HEA;HEP

Contrast

Magn. preparation	Non-sel. IR
TI	1100 ms
Flip angle	7.0 deg
Fat suppr.	None
Water suppr.	None
Averaging mode	Long term
Reconstruction	Magn./Phase
Measurements	1
Multiple series	Each measurement

Resolution

Base resolution	192
Phase resolution	100 %
Slice resolution	100 %
Phase partial Fourier	6/8
Slice partial Fourier	Off
Interpolation	Off
PAT mode	GRAPPA
Accel. factor PE	4
Ref. lines PE	32
Matrix Coil Mode	Auto (Triple)
Reference scan mode	Integrated
Image Filter	Off
Distortion Corr.	Off
Unfiltered images	Off
Prescan Normalize	On
Normalize	Off
B1 filter	Off
Raw filter	Off
Elliptical filter	Off

Geometry

Multi-slice mode	Single shot
Series	Interleaved
Table position	H
Table position	0 mm
Inline Composing	Off

System

Body	Off
HEP	On
HEA	On
Positioning mode	REF
MSMA	S - C - T
Sagittal	R >> L
Coronal	A >> P
Transversal	F >> H
Save uncombined	Off
Coil Combine Mode	Adaptive Combine
AutoAlign	Head > Brain Atlas
Auto Coil Select	Off
Shim mode	Standard
Adjust with body coil	Off
Confirm freq. adjustment	Off
Assume Silicone	Off
? Ref. amplitude 1H	0.000 V
Adjustment Tolerance	Auto
Adjust volume	
! Position	R3.0 A3.0 H0.0
! Orientation	T > C-12.5
! Rotation	0.00 deg
! R >> L	216 mm
! A >> P	216 mm
! F >> H	141 mm

Physio

1st Signal/Mode	None
Dark blood	Off

Inline

Subtract	Off
Std-Dev-Sag	Off
Std-Dev-Cor	Off
Std-Dev-Tra	Off
Std-Dev-Time	Off
MIP-Sag	Off
MIP-Cor	Off
MIP-Tra	Off
MIP-Time	Off
Save original images	On

Sequence

Introduction	Off
Dimension	3D
Elliptical scanning	Off
Asymmetric echo	Off

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SIEMENS MAGNETOM TrioTim syngo MR B17

Contrasts	4
Bandwidth 1	651 Hz/Px
Bandwidth 2	651 Hz/Px
Bandwidth 3	651 Hz/Px
Bandwidth 4	651 Hz/Px
Flow comp. 1	No
Flow comp. 2	No
Flow comp. 3	No
Flow comp. 4	No
Echo spacing	9.8 ms
RF pulse type	Fast
Gradient mode	Fast
Excitation	Non-sel.
RF spoiling	On
Readout polarity	Positive
Readout trajectory	Bipolar
Add. scale factor	4.0
Gradient spoiling	Integral
Gradient moment factor	3.0
Siemens reconstruction	On
Save raw k-space data	Off
Averaging	RMS

Part VI

BOLD Protocol Reference

SIEMENS MAGNETOM TrioTim syngo MR B17

\\USER\Investigators\CAP_Matrix\CAP_Full\fMRI_resting_state

TA: 6:12 PAT: Off Voxel size: 3.0×3.0×3.0 mm Rel. SNR: 1.00 USER: ep2d_bold_MGH

Properties

Prio Recon	Off
Before measurement	
After measurement	
Load to viewer	On
Inline movie	Off
Auto store images	On
Load to stamp segments	On
Load images to graphic segments	Off
Auto open inline display	On
Start measurement without further preparation	Off
Wait for user to start	On
Start measurements	single

Routine

Slice group 1	
Slices	47
Dist. factor	0 %
Position	R3.0 A3.0 H0.0
Orientation	T > C-12.5
Phase enc. dir.	A >> P
Rotation	0.00 deg
Phase oversampling	0 %
FoV read	216 mm
FoV phase	100.0 %
Slice thickness	3.00 mm
TR	3000 ms
TE	30 ms
Averages	1
Concatenations	1
Filter	None
Coil elements	HEA;HEP

Contrast

MTC	Off
Flip angle	85 deg
Fat suppr.	Fat sat.
Averaging mode	Long term
Reconstruction	Magnitude
Measurements	124
Delay in TR	0 ms
Multiple series	Off

Resolution

Base resolution	72
Phase resolution	100 %
Phase partial Fourier	Off
Interpolation	Off
PAT mode	None
Matrix Coil Mode	Auto (CP)
Distortion Corr.	Off
Prescan Normalize	Off
Raw filter	On
Elliptical filter	Off
Hamming	Off

Geometry

Multi-slice mode	Interleaved
Series	Interleaved
Special sat.	None
Table position	H
Table position	0 mm
Inline Composing	Off

System

Body	Off
HEP	On
HEA	On
Positioning mode	REF
MSMA	S - C - T
Sagittal	R >> L
Coronal	A >> P
Transversal	F >> H
Coil Combine Mode	Sum of Squares
AutoAlign	Head > Brain Atlas
Auto Coil Select	Off
Shim mode	Standard
Adjust with body coil	Off
Confirm freq. adjustment	Off
Assume Silicone	Off
? Ref. amplitude 1H	0.000 V
Adjustment Tolerance	Auto
Adjust volume	
Position	R3.0 A3.0 H0.0
Orientation	T > C-12.5
Rotation	0.00 deg
R >> L	216 mm
A >> P	216 mm
F >> H	141 mm

Physio

1st Signal/Mode	None

BOLD

GLM Statistics	Off
Dynamic t-maps	Off
Starting ignore meas	0
Ignore after transition	0
Model transition states	Off
Temp. highpass filter	Off
Threshold	4.00
Paradigm size	3
Meas[1]	Baseline
Meas[2]	Baseline
Meas[3]	Active
Motion correction	Off
Spatial filter	Off

Sequence

Introduction	Off
Bandwidth	2240 Hz/Px
Free echo spacing	Off
Echo spacing	0.51 ms
EPI factor	72
RF pulse type	Normal
Gradient mode	Fast
Dummy Scans	0
FFT Scale Factor	1.00

Part VII

MEMPRAGE DICOM Header Reference

```
(0008, 0005)  CharacterSet                    CS           10  ISO_IR 100
(0008, 0008)  ImageType                       CS           36  ORIGINAL
                                                               PRIMARY
                                                               OTHER
                                                               ND
                                                               NORM
                                                               MEAN
(0008, 0012)  InstanceCreationDate            DA            8 OMITTED HERE FOR IDENTIFICATION
(0008, 0013)  InstanceCreationTime            TM           14 OMITTED HERE FOR IDENTIFICATION
(0008, 0016)  SopClass                        UI           26 OMITTED HERE FOR IDENTIFICATION
(0008, 0018)  SopInstance                     UI           52 OMITTED HERE FOR IDENTIFICATION
(0008, 0020)  StudyDate                       DA            8 OMITTED HERE FOR IDENTIFICATION
(0008, 0021)  SeriesDate                      DA            8 OMITTED HERE FOR IDENTIFICATION
(0008, 0022)  AcquisitionDate                 DA            8 OMITTED HERE FOR IDENTIFICATION
(0008, 0023)  ContentDate                     DA            8 OMITTED HERE FOR IDENTIFICATION
(0008, 0030)  StudyTime                       TM           14 OMITTED HERE FOR IDENTIFICATION
(0008, 0031)  SeriesTime                      TM           14 OMITTED HERE FOR IDENTIFICATION
(0008, 0032)  AcquisitionTime                 TM           14 OMITTED HERE FOR IDENTIFICATION
(0008, 0033)  ContentTime                     TM           14 OMITTED HERE FOR IDENTIFICATION
(0008, 0050)  AcessionNumber                  SH            0
(0008, 0060)  Modality                        CS            2  MR
(0008, 0070)  Manufacturer                    LO            8  SIEMENS
(0008, 0080)  InstitutionName                 LO           16 OMITTED HERE FOR IDENTIFICATION
(0008, 0081)  InstitutionAddress              ST           32 OMITTED HERE FOR IDENTIFICATION
(0008, 0090)  ReferringPhysician              PN            0
(0008, 1010)  StationName                     SH            6  MEDPC
(0008, 1030)  StudyDescription                LO           22 OMITTED HERE FOR IDENTIFICATION
(0008, 103e)  SeriesDescription               LO           16  T1_MEMPRAGE RMS
(0008, 1050)  PerformingPhysician             PN            0
(0008, 1070)  OperatorName                    PN            6 OMITTED HERE FOR IDENTIFICATION
(0008, 1090)  ModelName                       LO            8  TrioTim
(0008, 1140)  ReferencedImageSequence         SQ          306  √æ√ø
(0010, 0010)  PatientName                     PN           16 OMITTED HERE FOR IDENTIFICATION
(0010, 0020)  PatientId                       LO           48 OMITTED HERE FOR IDENTIFICATION
(0010, 0030)  PatientBirthDate                DA            8 OMITTED HERE FOR IDENTIFICATION
(0010, 0040)  PatientSex                      CS            2  F
(0010, 1010)  PatientAge                      AS            4 OMITTED HERE FOR IDENTIFICATION
(0010, 1030)  PatientWeight                   DS           14 OMITTED HERE FOR IDENTIFICATION
(0018, 0020)  ScanningSequence                CS            6  GR
                                                               IR
(0018, 0021)  SequenceVariant                 CS            6  SP
                                                               MP
(0018, 0022)  ScanOptions                     CS            6  IR
                                                               PFP
(0018, 0023)  MrAcquisitionType               CS            2  3D
(0018, 0024)  SequenceName                    SH           10  tfl3d4_ns
(0018, 0025)  AngioFlag                       CS            2  N
(0018, 0050)  SliceThickness                  DS           16  1.2000000476837
(0018, 0080)  RepetitionTime                  DS            4  2200
(0018, 0081)  EchoTime                        DS            4  1.54
(0018, 0082)  InversionTime                   DS            4  1100
(0018, 0083)  NumberOfAverages                DS            2  4
(0018, 0084)  ImagingFrequency                DS           10  123.263739
(0018, 0085)  ImagingNucleus                  SH            2  1H
(0018, 0086)  EchoNumber                      IS            2  1
(0018, 0087)  MagneticFieldStrength           DS            2  3
(0018, 0089)  PhaseEncodingSteps              IS            4  145
(0018, 0091)  EchoTrainLength                 IS            2  1
(0018, 0093)  PercentSampling                 DS            4  100
(0018, 0094)  PercentPhaseFov                 DS            4  100
(0018, 0095)  PixelBandwidth                  DS            4  651
(0018, 1000)  DeviceSerialNumber              LO            6 OMITTED HERE FOR IDENTIFICATION
(0018, 1020)  SoftwareVersion                 LO           12  syngo MR B17
(0018, 1030)  ProtocolName                    LO           12  T1_MEMPRAGE
(0018, 1251)  TransmittingCoil                SH            4  Body
(0018, 1310)  AcquisitionMatrix               US            8  0
                                                               192
                                                               192
                                                               0
(0018, 1312)  PhaseEncodingDirection          CS            4  ROW
(0018, 1314)  FlipAngle                       DS            2  7
(0018, 1315)  VariableFlipAngleFlag           CS            2  N
```

```
(0018, 1316)  SAR                                DS            16  0.07379501370909
(0018, 1318)  DB_DT                              DS             2  0
(0018, 5100)  PatientPosition                    CS             4  HFS
(0019, 0010)  unknown                            LO            18  SIEMENS MR HEADER
(0019, 1008)  unknown                            CS            12  IMAGE NUM 4
(0019, 1009)  unknown                            LO             4  1.0
(0019, 100b)  unknown                            DS             8  131727.5
(0019, 100f)  unknown                            SH             4  Fast
(0019, 1011)  unknown                            SH             2  No
(0019, 1012)  unknown                            SL            12  0
                                                                   0
                                                                   -1275
(0019, 1013)  unknown                            SL            12  0
                                                                   0
                                                                   -1275
(0019, 1014)  unknown                            IS             6  0
                                                                   0
                                                                   0
(0019, 1015)  unknown                            FD            24  -13.5665
                                                                   -123.575
                                                                   105.842
(0019, 1017)  unknown                            DS             2  1
(0019, 1018)  unknown                            IS             4  4000
(0020, 000d)  StudyInstanceUid                   UI            56  OMITTED HERE FOR IDENTIFICATION
(0020, 000e)  SeriesInstanceUid                  UI            58  OMITTED HERE FOR IDENTIFICATION
(0020, 0010)  StudyId                            SH             2  1
(0020, 0011)  SeriesNumber                       IS             2  5
(0020, 0012)  AcquisitionNumber                  IS             2  1
(0020, 0013)  InstanceNumber                     IS             2  72
(0020, 0032)  ImagePositionPatient               DS            50  -13.566503167318
                                                                   -123.57515817126
                                                                   105.84205514206
(0020, 0037)  ImageOrientationPatient            DS           102  0.04179473190323
                                                                   0.99780385064773
                                                                   -0.0513875083819
                                                                   0.03408366365402
                                                                   -0.0528263900391
                                                                   -0.9980218817177
(0020, 0052)  FrameOfReferenceUid                UI            52
1.3.12.2.1107.5.2.32.35380.1.20100424160346351.0.0.0
(0020, 1040)  PositionReference                  LO             0
(0020, 1041)  SliceLocation                      DS            16  -4.7753770674885
(0028, 0002)  SamplesPerPixel                    US             2  1
(0028, 0004)  PhotometricInterpretation          CS            12  MONOCHROME2
(0028, 0010)  ImageRows                          US             2  192
(0028, 0011)  ImageColumns                       US             2  192
(0028, 0030)  PixelSpacing                       DS            32  1.1979166269302
                                                                   1.1979166269302
(0028, 0100)  BitsAllocated                      US             2  16
(0028, 0101)  BitsStored                         US             2  12
(0028, 0102)  HighBit                            US             2  11
(0028, 0103)  PixelRepresentation                US             2  0
(0028, 0106)  SmallestImagePixelValue            US             2  0
(0028, 0107)  LargestImagePixelValue             US             2  488
(0028, 1050)  WindowCenter                       DS             4  281
(0028, 1051)  WindowWidth                        DS             4  617
(0028, 1055)  WindowCenterAndWidthExplanation    LO             6  Algo1
(0029, 0010)  unknown                            LO            18  SIEMENS CSA HEADER
(0029, 0011)  unknown                            LO            22  SIEMENS MEDCOM HEADER2
(0029, 1008)  unknown                            CS            12  IMAGE NUM 4
(0029, 1009)  unknown                            LO             8  20100424
(0029, 1010)  unknown                            OB          9468
SV10
--------------------------------------------------------------------------------
------------------------------S
(0029, 1018)  unknown                            CS             2  MR
(0029, 1019)  unknown                            LO             8  20100424
(0029, 1020)  unknown                            OB         58256
SV10
--------------------------------------------------------------------------------
------------------------------A
(0029, 1160)  unknown                            LO             4  com
```

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(0032, 1060)  RequestedProcedureDescription      LO           22  OMITTED HERE FOR IDENTIFICATION
(0040, 0244)  PerformedProcedureStepStartDate    DA            8  OMITTED HERE FOR IDENTIFICATION
(0040, 0245)  PerformedProcedureStepStartTime    TM           14  OMITTED HERE FOR IDENTIFICATION
(0040, 0253)  PerformedProcedureStepId           SH           16  OMITTED HERE FOR IDENTIFICATION
(0040, 0254)  PerformedProcedureStepDescription  LO           22  OMITTED HERE FOR IDENTIFICATION
(0051, 0010)  unknown                            LO           18  SIEMENS MR HEADER
(0051, 1008)  unknown                            CS           12  IMAGE NUM 4
(0051, 1009)  unknown                            LO            4  1.0
(0051, 100a)  unknown                            LO            8  TA 02:11
(0051, 100b)  unknown                            LO            8  192p*192
(0051, 100c)  unknown                            LO           12  FoV 229*229
(0051, 100d)  unknown                            SH            8  SP R4.8
(0051, 100e)  unknown                            LO           22  Sag>Cor(2.3)>Tra(-2.1)
(0051, 100f)  unknown                            LO           10  T:HEA;HEP
(0051, 1011)  unknown                            LO            2  p4
(0051, 1012)  unknown                            SH            4  TP 0
(0051, 1013)  unknown                            SH            4  +LPH
(0051, 1016)  unknown                            LO           16  p4 ND
                                                                   NORM
                                                                   MEAN
(0051, 1017)  unknown                            SH            6  SL 1.2
(0051, 1019)  unknown                            LO           10  A4
                                                                   IR
                                                                   PFP
```

Part VIII

BOLD DICOM Header Reference

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(0008, 0005)  CharacterSet                    CS          10  ISO_IR 100
(0008, 0008)  ImageType                       CS          28  ORIGINAL
                                                              PRIMARY
                                                              M
                                                              ND
                                                              MOSAIC
(0008, 0012)  InstanceCreationDate            DA           8 OMITTED HERE FOR IDENTIFICATION
(0008, 0013)  InstanceCreationTime            TM          14 OMITTED HERE FOR IDENTIFICATION
(0008, 0016)  SopClass                        UI          26 OMITTED HERE FOR IDENTIFICATION
(0008, 0018)  SopInstance                     UI          52 OMITTED HERE FOR IDENTIFICATION
(0008, 0020)  StudyDate                       DA           8 OMITTED HERE FOR IDENTIFICATION
(0008, 0021)  SeriesDate                      DA           8 OMITTED HERE FOR IDENTIFICATION
(0008, 0022)  AcquisitionDate                 DA           8 OMITTED HERE FOR IDENTIFICATION
(0008, 0023)  ContentDate                     DA           8 OMITTED HERE FOR IDENTIFICATION
(0008, 0030)  StudyTime                       TM          14 OMITTED HERE FOR IDENTIFICATION
(0008, 0031)  SeriesTime                      TM          14 OMITTED HERE FOR IDENTIFICATION
(0008, 0032)  AcquisitionTime                 TM          14 OMITTED HERE FOR IDENTIFICATION
(0008, 0033)  ContentTime                     TM          14 OMITTED HERE FOR IDENTIFICATION
(0008, 0050)  AcessionNumber                  SH           0
(0008, 0060)  Modality                        CS           2  MR
(0008, 0070)  Manufacturer                    LO           8  SIEMENS
(0008, 0080)  InstitutionName                 LO          16 OMITTED HERE FOR IDENTIFICATION
(0008, 0081)  InstitutionAddress              ST          32 OMITTED HERE FOR IDENTIFICATION
(0008, 0090)  ReferringPhysician              PN           0
(0008, 1010)  StationName                     SH           6  MEDPC
(0008, 1030)  StudyDescription                LO          22 OMITTED HERE FOR IDENTIFICATION
(0008, 103e)  SeriesDescription               LO          18 fMRI_resting_state
(0008, 1050)  PerformingPhysician             PN           0
(0008, 1070)  OperatorName                    PN           6 OMITTED HERE FOR IDENTIFICATION
(0008, 1090)  ModelName                       LO           8  TrioTim
(0008, 1140)  ReferencedImageSequence         SQ         306  √æ√ø
(0010, 0010)  PatientName                     PN          16 OMITTED HERE FOR IDENTIFICATION
(0010, 0020)  PatientId                       LO          48 OMITTED HERE FOR IDENTIFICATION
(0010, 0030)  PatientBirthDate                DA           8 OMITTED HERE FOR IDENTIFICATION
(0010, 0040)  PatientSex                      CS           2 OMITTED HERE FOR IDENTIFICATION
(0010, 1010)  PatientAge                      AS           4 OMITTED HERE FOR IDENTIFICATION
(0010, 1030)  PatientWeight                   DS          14 OMITTED HERE FOR IDENTIFICATION
(0018, 0020)  ScanningSequence                CS           2  EP
(0018, 0021)  SequenceVariant                 CS           2  SK
(0018, 0022)  ScanOptions                     CS           2  FS
(0018, 0023)  MrAcquisitionType               CS           2  2D
(0018, 0024)  SequenceName                    SH          12  epfid2d1_72
(0018, 0025)  AngioFlag                       CS           2  N
(0018, 0050)  SliceThickness                  DS           2  3
(0018, 0080)  RepetitionTime                  DS           4  3000
(0018, 0081)  EchoTime                        DS           2  30
(0018, 0083)  NumberOfAverages                DS           2  1
(0018, 0084)  ImagingFrequency                DS          10  123.26374
(0018, 0085)  ImagingNucleus                  SH           2  1H
(0018, 0086)  EchoNumber                      IS           2  1
(0018, 0087)  MagneticFieldStrength           DS           2  3
(0018, 0088)  SliceSpacing                    DS          16  2.9999999039362
(0018, 0089)  PhaseEncodingSteps              IS           2  72
(0018, 0091)  EchoTrainLength                 IS           2  1
(0018, 0093)  PercentSampling                 DS           4  100
(0018, 0094)  PercentPhaseFov                 DS           4  100
(0018, 0095)  PixelBandwidth                  DS           4  2240
(0018, 1000)  DeviceSerialNumber              LO           6 OMITTED HERE FOR IDENTIFICATION
(0018, 1020)  SoftwareVersion                 LO          12  syngo MR B17
(0018, 1030)  ProtocolName                    LO          18  fMRI_resting_state
(0018, 1251)  TransmittingCoil                SH           4  Body
(0018, 1310)  AcquisitionMatrix               US           8  72
                                                              0
                                                              0
                                                              72
(0018, 1312)  PhaseEncodingDirection          CS           4  COL
(0018, 1314)  FlipAngle                       DS           2  85
(0018, 1315)  VariableFlipAngleFlag           CS           2  N
(0018, 1316)  SAR                             DS          16  0.14298183329098
(0018, 1318)  DB_DT                           DS           2  0
(0018, 5100)  PatientPosition                 CS           4  HFS
(0019, 0010)  unknown                         LO          18  SIEMENS MR HEADER
```

```
(0019, 1008)  unknown                          CS            12  IMAGE NUM 4
(0019, 1009)  unknown                          LO             4  1.0
(0019, 100a)  unknown                          US             2  47
(0019, 100b)  unknown                          DS             2  35
(0019, 100f)  unknown                          SH             4  Fast
(0019, 1011)  unknown                          SH             2  No
(0019, 1012)  unknown                          SL            12  0
                                                                 0
                                                                 -1275
(0019, 1013)  unknown                          SL            12  0
                                                                 0
                                                                 -1275
(0019, 1014)  unknown                          IS             6  0
                                                                 0
                                                                 0
(0019, 1015)  unknown                          FD            24  -788.847
                                                                 -736.79
                                                                 -52.9814
(0019, 1016)  unknown                          DS             6  96.385
(0019, 1017)  unknown                          DS             2  1
(0019, 1018)  unknown                          IS             4  3100
(0019, 1028)  unknown                          FD             8  27.233
(0019, 1029)  unknown                          FD           376  0
                                                                 1537.5
                                                                 65
                                                                 1602.5
                                                                 127.5
                                                                 1665
                                                                 192.5
                                                                 1730
                                                                 255
                                                                 1795
                                                                 320
                                                                 1857.5
                                                                 385
                                                                 1922.5
                                                                 447.5
                                                                 1985
                                                                 512.5
                                                                 2050
                                                                 577.5
                                                                 2115
                                                                 640
                                                                 2177.5
                                                                 705
                                                                 2242.5
                                                                 770
                                                                 2307.5
                                                                 832.5
                                                                 2370
                                                                 897.5
                                                                 2435
                                                                 960
                                                                 2500
                                                                 1025
                                                                 2562.5
                                                                 1090
                                                                 2627.5
                                                                 1152.5
                                                                 2690
                                                                 1217.5
                                                                 2755
                                                                 1282.5
                                                                 2820
                                                                 1345
                                                                 2882.5
                                                                 1410
                                                                 2947.5
                                                                 1472.5
(0020, 000d)  StudyInstanceUid                 UI            56  OMITTED HERE FOR IDENTIFICATION
(0020, 000e)  SeriesInstanceUid                UI            58  OMITTED HERE FOR IDENTIFICATION
(0020, 0010)  StudyId                          SH             2  1
```

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(0020, 0011)  SeriesNumber                       IS            2  14
(0020, 0012)  AcquisitionNumber                  IS            2  33
(0020, 0013)  InstanceNumber                     IS            2  33
(0020, 0032)  ImagePositionPatient               DS           50  -788.84719829265
                                                                  -736.78994392663
                                                                  -52.981431394183
(0020, 0037)  ImageOrientationPatient            DS          100  0.9985446782004
                                                                  -0.0399606693677
                                                                  0.03621699243911
                                                                  0.04179484065056
                                                                  0.99780383837675
                                                                  -0.0513876582033
(0020, 0052)  FrameOfReferenceUid                UI           52
1.3.12.2.1107.5.2.32.35380.1.20100424160346351.0.0.0
(0020, 1040)  PositionReference                  LO            0
(0020, 1041)  SliceLocation                      DS           16  -64.911658774742
(0028, 0002)  SamplesPerPixel                    US            2  1
(0028, 0004)  PhotometricInterpretation          CS           12  MONOCHROME2
(0028, 0010)  ImageRows                          US            2  504
(0028, 0011)  ImageColumns                       US            2  504
(0028, 0030)  PixelSpacing                       DS            4  3
                                                                  3
(0028, 0100)  BitsAllocated                      US            2  16
(0028, 0101)  BitsStored                         US            2  12
(0028, 0102)  HighBit                            US            2  11
(0028, 0103)  PixelRepresentation                US            2  0
(0028, 0106)  SmallestImagePixelValue            US            2  0
(0028, 0107)  LargestImagePixelValue             US            2  1887
(0028, 1050)  WindowCenter                       DS            4  703
(0028, 1051)  WindowWidth                        DS            4  1517
(0028, 1055)  WindowCenterAndWidthExplanation    LO            6  Algo1
(0029, 0010)  unknown                            LO           18  SIEMENS CSA HEADER
(0029, 0011)  unknown                            LO           22  SIEMENS MEDCOM HEADER2
(0029, 1008)  unknown                            CS           12  IMAGE NUM 4
(0029, 1009)  unknown                            LO            8  20100424
(0029, 1010)  unknown                            OB        11220
SV10
-------------------------------------------------------------------------------------------------
-------------------------S
(0029, 1018)  unknown                            CS            2  MR
(0029, 1019)  unknown                            LO            8  20100424
(0029, 1020)  unknown                            OB        86208
SV10
-------------------------------------------------------------------------------------------------
-------------------------A
(0029, 1160)  unknown                            LO            4  com
(0032, 1060)  RequestedProcedureDescription      LO           22 OMITTED HERE FOR IDENTIFICATION
(0040, 0244)  PerformedProcedureStepStartDate    DA            8 OMITTED HERE FOR IDENTIFICATION
(0040, 0245)  PerformedProcedureStepStartTime    TM           14 OMITTED HERE FOR IDENTIFICATION
(0040, 0253)  PerformedProcedureStepId           SH           16 OMITTED HERE FOR IDENTIFICATION
(0040, 0254)  PerformedProcedureStepDescription  LO           22 OMITTED HERE FOR IDENTIFICATION
(0051, 0010)  unknown                            LO           18  SIEMENS MR HEADER
(0051, 1008)  unknown                            CS           12  IMAGE NUM 4
(0051, 1009)  unknown                            LO            4  1.0
(0051, 100a)  unknown                            LO            8  TA 00.03
(0051, 100b)  unknown                            LO            6  72*72
(0051, 100c)  unknown                            LO           14  FoV 1512*1512
(0051, 100e)  unknown                            LO           22  Tra>Cor(-3.0)>Sag(2.0)
(0051, 100f)  unknown                            LO           10  C:HEA;HEP
(0051, 1012)  unknown                            SH            4  TP 0
(0051, 1013)  unknown                            SH            4  +LPH
(0051, 1016)  unknown                            LO           12  M
                                                                  ND
                                                                  MOSAIC
(0051, 1017)  unknown                            SH            6  SL 3.0
(0051, 1019)  unknown                            LO            6  A1
                                                                  FS
```

Part IX

GSP Data Use Terms

GSP Open Access Data Use Terms

Last updated: Apr 22, 2014.

I request access to data collected as part of the Brain Genomics Superstruct Project (GSP) of Harvard University and the Massachusetts General Hospital, and I agree to the following:

1. I will not attempt to establish the identity of or attempt to contact any of the included human subjects.

2. I will not attempt to link any of the distributed data to any other data that might contain information about the included human subjects.

3. I understand that under no circumstances will the code that would link these data to Protected Health Information be given to me, nor will any additional information about individual human subjects be released to me under these Open Access Data Use Terms.

4. I will comply with all relevant rules and regulations imposed by my institution. This may mean that I need my research to be approved or declared exempt by a committee that oversees research on human subjects e.g., my Internal Review Board or Ethics Committee. Different committees operate under different national, state, and local laws and may interpret regulations differently, so it is important to ask about this.

5. I may redistribute original GSP Open Access data and any derived data as long as the data are redistributed under these same Data Use Terms.

6. I will acknowledge the use of GSP data and data derived from GSP data when publicly presenting any results or algorithms that benefitted from their use.

    a. Papers, book chapters, books, posters, oral presentations, and all other printed and digital presentations of results derived from GSP data should contain the following wording in the acknowledgments section: “Data were provided [in part] by the Brain Genomics Superstruct Project of Harvard University and the Massachusetts General Hospital, (Principal Investigators: Randy Buckner, Joshua Roffman, and Jordan Smoller), with support from the Center for Brain Science Neuroinformatics Research Group, the Athinoula A. Martinos Center for Biomedical Imaging, and the Center for Human Genetic Research. 20 individual investigators at Harvard and MGH generously contributed data to

the overall project."

b. Authors of publications or presentations using GSP data should cite relevant publications describing the methods used by the GSP to acquire and process the data. The specific publications that are appropriate to cite in any given study will depend on what GSP data were used and for what purposes. An annotated and appropriately up-to-date list of publications that may warrant consideration is available at http://neuroinformatics.harvard.edu/gsp/

c. The GSP as a consortium should not be included as an author of publications or presentations if this authorship would be based solely on the use of GSP data.

7. Failure to abide by these guidelines will result in termination of my privileges to access GSP data.

GSP Open Access Data Use Terms Version: 2014-Apr-22