Phase 2: Protocol Validation for Individual Subjects

This notebook contains results validating the AFID32 protocol on individual subjects from the OASIS-1 databank.

OAS1 Subset: Demographics

Demographics here.

'Total: 58.0 +/- 17.9 years; Range: 25-91'

'Female: 17/30 (56.7%)'

'Total: 1.28 +/- 3.03 mm; Outliers: 28/2880 (0.97%)'

	fid	subject	mri_session	name	description	mean_AFLE
1373	29	OAS1_0203	MR1	29	R ventral occipital horn	16.19882
1501	29	OAS1_0216	MR1	29	R ventral occipital horn	17.77257
1502	30	OAS1_0216	MR1	30	L ventral occipital horn	11.61197
2043	27	OAS1_0256	MR1	28	L indusium griseum origin	15.80488
2044	28	OAS1_0256	MR1	27	R indusium griseum origin	15.35560
2141	29	OAS1_0263	MR1	29	R ventral occipital horn	39.35092
2142	30	OAS1_0263	MR1	30	L ventral occipital horn	40.64370
2173	29	OAS1_0263	MR1	29	R ventral occipital horn	78.74419
2174	30	OAS1_0263	MR1	30	L ventral occipital horn	80.42163
2205	29	OAS1_0263	MR1	29	R ventral occipital horn	39.39868
2206	30	OAS1_0263	MR1	30	L ventral occipital horn	39.79291
2235	27	OAS1_0266	MR1	27	R indusium griseum origin	23.44415
2236	28	OAS1_0266	MR1	28	L indusium griseum origin	24.30401
2267	27	OAS1_0266	MR1	27	R indusium griseum origin	10.56158
2268	28	OAS1_0266	MR1	28	L indusium griseum origin	12.04423
2299	27	OAS1_0266	MR1	27	R indusium griseum origin	12.98773
2300	28	OAS1_0266	MR1	28	L indusium griseum origin	12.35749
2534	6	OAS1_0303	MR1	6	R superior LMS	14.24872
2535	7	OAS1_0303	MR1	7	L superior LMS	13.98733
2653	29	OAS1_0343	MR1	29	R ventral occipital horn	15.83104
2942	30	OAS1_0365	MR1	30	L ventral occipital horn	10.92964
3387	27	OAS1_0456	MR1	27	R indusium griseum origin	23.38522
3388	28	OAS1_0456	MR1	28	L indusium griseum origin	23.76189
3390	30	OAS1_0456	MR1	30	L ventral occipital horn	17.74944
3419	27	OAS1_0456	MR1	27	R induseum griseum origin	10.64591
3420	28	OAS1_0456	MR1	28	L induseum griseum origin	10.43077
3451	27	OAS1_0456	MR1	27	R indusium griseum origin	12.88382
3452	28	OAS1_0456	MR1	28	L indusium griseum origin	13.53997

Individual Subject Results: Post-QC

Re-analysis after quality control and filtering of outliers.

'Total: 0.94 +/- 0.73 mm; Outliers: 0/2872 (0.00%)'

Inter-Rater AFLE

'Total: 1.58 +/- 1.02 mm'

AFID	Description	Mean AFLE Pre-QC	Mean AFLE Post-QC	Inter-Rater AFLE Post-QC
01	AC	0.36±0.21 (1.29)	0.36±0.21 (1.29)	0.60±0.25 (1.38)
02	PC	0.34±0.16 (0.88)	0.34±0.16 (0.88)	0.57±0.21 (1.22)
03	infracollicular sulcus	0.78±0.48 (3.07)	0.78±0.48 (3.07)	1.34±0.64 (3.84)
04	PMJ	0.83±0.49 (2.44)	0.83±0.49 (2.44)	1.41±0.55 (2.55)
05	superior interpeduncular fossa	1.20±0.75 (3.50)	1.20±0.75 (3.50)	2.04±0.90 (4.25)
06	R superior LMS	1.30±1.74 (14.25)	1.01±0.55 (2.85)	1.70±0.68 (3.13)
07	L superior LMS	1.36±1.71 (13.99)	1.06±0.61 (3.45)	1.72±0.71 (3.89)
08	R inferior LMS	1.13±0.75 (5.13)	1.03±0.57 (2.99)	1.77±0.74 (3.43)
09	L inferior LMS	1.10±0.80 (5.31)	1.01±0.62 (2.72)	1.71±0.86 (3.71)
10	culmen	0.99±0.99 (5.66)	0.83±0.62 (3.07)	1.35±0.82 (3.42)
11	intermammillary sulcus	0.60±0.31 (1.62)	0.60±0.31 (1.62)	1.02±0.41 (1.86)
12	R MB	0.40±0.23 (1.11)	0.40±0.23 (1.11)	0.69±0.32 (1.52)
13	L MB	0.36±0.20 (1.20)	0.36±0.20 (1.20)	0.62±0.29 (1.62)
14	pineal gland	0.68±0.47 (1.98)	0.68±0.47 (1.98)	1.16±0.69 (2.63)
15	R LV at AC	1.00±0.90 (5.28)	0.91±0.72 (4.45)	1.55±1.08 (5.86)
16	L LV at AC	1.01±0.80 (4.53)	0.94±0.70 (4.53)	1.60±1.08 (5.47)
17	R LV at PC	0.92±0.54 (3.42)	0.92±0.54 (3.42)	1.54±0.77 (3.84)
18	L LV at PC	0.87±0.42 (2.20)	0.87±0.42 (2.20)	1.46±0.55 (2.80)
19	genu of CC	0.97±0.81 (5.16)	0.89±0.63 (3.69)	1.50±0.89 (4.30)
20	splenium	0.54±0.25 (1.24)	0.54±0.25 (1.24)	0.91±0.35 (1.66)
21	R AL temporal horn	1.44±1.09 (7.01)	1.30±0.86 (4.45)	2.21±1.13 (5.92)
22	L AL temporal horn	1.22±0.77 (4.11)	1.22±0.77 (4.11)	2.04±1.01 (4.47)
23	R superior AM temporal horn	1.28±1.27 (8.22)	1.12±0.88 (4.69)	1.86±1.19 (4.97)
24	L superior AM temporal horn	1.09±1.22 (7.54)	0.83±0.61 (3.66)	1.39±0.85 (4.60)
25	R inferior AM temporal horn	1.69±1.43 (9.03)	1.44±0.91 (4.72)	2.39±1.23 (5.07)
26	L inferior AM temporal horn	1.99±1.75 (8.79)	1.49±1.09 (4.70)	2.42±1.47 (6.64)
27	R indusium griseum origin	3.13±4.19 (23.44)	1.77±0.99 (4.77)	2.95±1.20 (5.75)
28	L indusium griseum origin	2.99±4.30 (24.30)	1.68±1.00 (5.00)	2.75±1.29 (5.78)
29	R ventral occipital horn	3.64±10.36 (78.74)	0.69±0.39 (2.11)	1.14±0.54 (2.53)
30	L ventral occipital horn	3.43±10.38 (80.42)	0.86±0.67 (4.94)	1.39±0.98 (5.72)
31	R olfactory sulcal fundus	0.99±0.53 (2.29)	0.99±0.53 (2.29)	1.71±0.60 (2.84)
32	L olfactory sulcal fundus	1.21±0.74 (4.53)	1.21±0.74 (4.53)	2.11±0.92 (5.81)

Secondary Analyses

We evaluated whether there was any evidence of an effect of demographics on AFLE.

(Intercept)	0.7694	0e+00
age	0.0030	1e-04

Did AFLE worsen with the age of the subject for specific AFIDs?

We wanted to see if specific AFIDs tended to worsen with age of the OAS1 participant scan. Worsened for AFID17-18: bilateral LV at PC.

fid	(Intercept)	pval_(Intercept)	age	pval_session	pval_session_adjusted	pval_session_significant
1	0.19	0.0102	0.00	0.0133	0.1422	FALSE
2	0.24	0.0001	0.00	0.0964	0.3426	FALSE
3	0.93	0.0000	0.00	0.3885	0.5920	FALSE
4	0.86	0.0000	0.00	0.8868	0.9063	FALSE
5	0.81	0.0033	0.01	0.1364	0.4095	FALSE
6	1.24	0.0000	0.00	0.2292	0.4584	FALSE
7	0.66	0.0035	0.01	0.0572	0.2466	FALSE
8	0.79	0.0003	0.00	0.2276	0.4584	FALSE
9	0.60	0.0074	0.01	0.0557	0.2466	FALSE
10	0.61	0.0075	0.00	0.3133	0.5321	FALSE
11	0.67	0.0000	0.00	0.5306	0.7075	FALSE
12	0.52	0.0000	0.00	0.1408	0.4095	FALSE
13	0.42	0.0000	0.00	0.4399	0.6120	FALSE
14	0.73	0.0001	0.00	0.7578	0.8362	FALSE
15	0.82	0.0025	0.00	0.7391	0.8362	FALSE
16	0.88	0.0008	0.00	0.8194	0.8741	FALSE
17	0.18	0.3163	0.01	0.0000	0.0013	TRUE
18	0.44	0.0030	0.01	0.0029	0.0461	TRUE
19	0.92	0.0002	0.00	0.9063	0.9063	FALSE
20	0.44	0.0000	0.00	0.2772	0.5217	FALSE
21	0.92	0.0043	0.01	0.2049	0.4584	FALSE
22	1.14	0.0001	0.00	0.7487	0.8362	FALSE
23	0.99	0.0029	0.00	0.6622	0.8150	FALSE
24	0.62	0.0057	0.00	0.3294	0.5321	FALSE
25	1.27	0.0002	0.00	0.5861	0.7502	FALSE
26	1.86	0.0000	-0.01	0.3325	0.5321	FALSE
27	1.13	0.0021	0.01	0.0616	0.2466	FALSE
28	1.25	0.0008	0.01	0.2183	0.4584	FALSE
29	0.41	0.0039	0.00	0.0404	0.2466	FALSE
30	0.36	0.1322	0.01	0.0345	0.2466	FALSE
31	0.84	0.0000	0.00	0.4201	0.6111	FALSE
32	0.84	0.0022	0.01	0.1563	0.4167	FALSE

```
R version 3.5.1 (2018-07-02)
Platform: x86_64-apple-darwin14.5.0 (64-bit)
Running under: macOS High Sierra 10.13.2

Matrix products: default
BLAS: /System/Library/Frameworks/Accelerate.framework/Versions/A/Frameworks/vecLib.framework/Versions/A/libBLAS.dylib
LAPACK: /System/Library/Frameworks/Accelerate.framework/Versions/A/Frameworks/vecLib.framework/Versions/A/libLAPACK.dylib

locale:
[1] en_CA.UTF-8/en_CA.UTF-8/en_CA.UTF-8/C/en_CA.UTF-8/en_CA.UTF-8

attached base packages:
[1] stats     graphics  grDevices utils     datasets  methods   base

other attached packages:
[1] plot3D_1.1.1   ggplot2_3.0.0  reshape2_1.4.3 digest_0.6.16  plyr_1.8.4

loaded via a namespace (and not attached):
 [1] Rcpp_0.12.17     compiler_3.5.1   pillar_1.3.0     bindr_0.1.1
 [5] base64enc_0.1-3  tools_3.5.1      uuid_0.1-2       jsonlite_1.5
 [9] evaluate_0.11    tibble_1.4.2     gtable_0.2.0     pkgconfig_2.0.2
[13] rlang_0.2.1      IRdisplay_0.5.0  IRkernel_0.8.12  bindrcpp_0.2.2
[17] repr_0.15.0      withr_2.1.2      stringr_1.3.1    dplyr_0.7.6
[21] grid_3.5.1       tidyselect_0.2.4 glue_1.3.0       R6_2.2.2
[25] pbdZMQ_0.3-3     purrr_0.2.5      magrittr_1.5     scales_1.0.0
[29] htmltools_0.3.6  misc3d_0.8-4     assertthat_0.2.0 colorspace_1.3-2
[33] stringi_1.2.4    lazyeval_0.2.1   munsell_0.5.0    crayon_1.3.4
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