

Supplementary Table 1: One-way ANOVA and multiple comparison procedure to assess differences in BAG across groups.

One-way ANOVA					
source of variation	df	ss	ms	F	p
Between Groups	3	174.784	58.261	61.163	<0.001
Residual	1266	1205.945	0.953		
Total	1269	1380.729			

Multiple Comparison Procedures (Holm-Sidak method)			
Comparison for factor Group			
Comparison	Diff of Means	t	p
MCI vs. HC	0.425	5.687	<0.001
AD vs. MCI	0.466	5.448	<0.001
FTD vs. HC	0.572	4.249	<0.001
AD vs. FTD	0.319	2.263	0.047
FTD vs. MCI	0.147	1.018	0.049

HC: healthy controls, MCI: mild cognitive impairment, bvFTD: behavioral variant frontotemporal dementia, AD: Alzheimer's disease

Supplementary Table 2: Relevant features for the brain clock of alpha oscillations in healthy participants (HC)

group	EEG band	band definition	Spectral metric	brain region	hemisphere	SHAP
HC	low α	subject specific	RPD	hippocampus	right	258.9
	α 2	canonical	EPP	parietal lobe	left	174.6
	low α	subject specific	EPP	occipital lobe	right	145.5
	low α	subject specific	RPD	hippocampus	left	102.5
	-	subject specific	IAF	orbital cortex	left	95.6
	-	subject specific	IAF	operculum	right	87.2
	-	subject specific	IAF	hippocampus	left	80.4
	-	subject specific	TF	inferior frontal gyrus	right	57.3
	low α	subject specific	EPP	hippocampus	left	53.9
	-	subject specific	TF	operculum	left	34.2
	low α	subject specific	RPD	parietal lobe	right	33.2
	α 2	canonical	EPP	parietal lobe	right	25.7
	-	subject specific	TF	hippocampus	left	22.4
	-	subject specific	IAF	operculum	left	21.4
	low α	subject specific	EPP	occipital lobe	left	17.8
	-	subject specific	IAF	hippocampus	right	17.3
	high α	subject specific	EPP	hippocampus	left	10.6
	-	subject specific	IAF	occipital lobe	left	7.9
	α 2	canonical	RPD	parietal lobe	left	7.0
	low α	subject specific	EPPG	cingulate cortex	left	6.6
	-	subject specific	TF	superior frontal gyrus	right	5.0
	-	subject specific	TF	orbital cortex	right	4.3
	low α	subject specific	EPP	cingulate cortex	right	3.4
	high α	subject specific	RPD	hippocampus	left	2.2
	-	subject specific	IAF	occipital lobe	right	1.1
	α 2	canonical	EPP	occipital lobe	right	1.0
	-	subject specific	TF	hippocampus	right	0.9
	high α	subject specific	EPP	parietal lobe	right	0.6
	-	subject specific	TF	superior frontal gyrus	left	0.6
	α 2	canonical	RPD	occipital lobe	right	0.6
	-	subject specific	IAF	superior frontal gyrus	right	0.3
	α 2	canonical	RPD	parietal lobe	right	0.3
	α 2	canonical	RPD	cingulate cortex	left	0.2
	low α	subject specific	EPP	parietal lobe	right	0.2
	-	subject specific	TF	orbital cortex	left	0.2
	-	subject specific	IAF	middle frontal gyrus	left	0.1
	high α	subject specific	RPD	parietal lobe	right	0.1
	-	subject specific	IAF	inferior frontal gyrus	right	0.1
	-	subject specific	IAF	middle frontal gyrus	right	0.1

RPD: relative power density, EPP: equivalent percent power

Supplementary Table 3: Relevant features for the brain clock of alpha oscillations in individuals with mild cognitive impairment (MCI)

group	EEG band	band definition	Spectral metric	brain region	hemisphere	SHAP
MCI	low α	subject specific	RPD	hippocampus	right	63.6
	low α	subject specific	EPP	occipital lobe	right	47.0
	α 2	canonical	EPP	parietal lobe	left	40.6
	-	subject specific	IAF	operculum	right	29.8
	-	subject specific	IAF	orbital cortex	left	29.7
	-	subject specific	IAF	hippocampus	left	26.5
	low α	subject specific	RPD	hippocampus	left	22.1
	low α	subject specific	EPP	hippocampus	left	19.9
	-	subject specific	TF	inferior frontal gyrus	right	17.5
	-	subject specific	TF	operculum	left	10.6
	-	subject specific	TF	hippocampus	left	7.0
	-	subject specific	IAF	operculum	left	6.9
	low α	subject specific	RPD	parietal lobe	right	6.9
	-	subject specific	IAF	hippocampus	right	6.2
	low α	subject specific	EPP	occipital lobe	left	5.4
	α 2	canonical	EPP	parietal lobe	right	5.2
	-	subject specific	IAF	occipital lobe	left	2.3
	high α	subject specific	EPP	hippocampus	left	2.1
	low α	subject specific	EPP	cingulate cortex	left	2.0
	α 2	canonical	RPD	parietal lobe	left	1.7
	-	subject specific	TF	superior frontal gyrus	right	1.5
	-	subject specific	TF	orbital cortex	right	1.3
	low α	subject specific	EPP	cingulate cortex	right	1.0
	high α	subject specific	RPD	hippocampus	left	0.5
	-	subject specific	IAF	occipital lobe	right	0.4
	-	subject specific	TF	hippocampus	right	0.3
	α 2	canonical	EPP	occipital lobe	right	0.2
	-	subject specific	TF	superior frontal gyrus	left	0.2
	-	subject specific	IAF	superior frontal gyrus	right	0.1
	high α	subject specific	EPP	parietal lobe	right	0.1
	α 2	canonical	RPD	occipital lobe	right	0.1
	α 2	canonical	RPD	cingulate cortex	left	0.1
	α 2	canonical	RPD	parietal lobe	right	0.1
	low α	subject specific	EPP	parietal lobe	right	0.1

RPD: relative power density, EPP: equivalent percent power

Supplementary Table 4: Relevant features for the brain clock of alpha oscillations in patients with behavioral variant frontotemporal dementia

group	EEG band	band definition	Spectral metric	brain region	hemisphere	SHAP
bvFTD	low α	subject specific	RPD	hippocampus	right	25.2
	α 2	canonical	EPP	parietal lobe	left	16.8
	low α	subject specific	EPP	occipital lobe	right	12.4
	low α	subject specific	RPD	hippocampus	left	7.8
	-	subject specific	IAF	orbital cortex	left	6.8
	-	subject specific	IAF	operculum	right	6.4
	-	subject specific	IAF	hippocampus	left	5.7
	-	subject specific	TF	inferior frontal gyrus	right	4.6
	low α	subject specific	EPP	hippocampus	left	4.3
	low α	subject specific	RPD	parietal lobe	right	3.7
	α 2	canonical	EPP	parietal lobe	right	2.9
	-	subject specific	TF	operculum	left	2.7
	-	subject specific	TF	hippocampus	left	1.8
	-	subject specific	IAF	operculum	left	1.7
	low α	subject specific	EPP	occipital lobe	left	1.4
	-	subject specific	IAF	hippocampus	right	1.3
	high α	subject specific	EPP	hippocampus	left	0.8
	α 2	canonical	RPD	parietal lobe	left	0.6
	low α	subject specific	EPP	cingulate cortex	left	0.5
	-	subject specific	IAF	occipital lobe	left	0.5
	-	subject specific	TF	superior frontal gyrus	right	0.3
	-	subject specific	TF	orbital cortex	right	0.4
	low α	subject specific	EPP	cingulate cortex	right	0.2
	high α	subject specific	RPD	hippocampus	left	0.2
	-	subject specific	IAF	occipital lobe	right	0.1
	α 2	canonical	EPP	occipital lobe	right	0.1
	high α	subject specific	EPP	parietal lobe	right	0.1
	-	subject specific	TF	hippocampus	right	0.1

RPD: relative power density, EPP: equivalent percent power

Supplementary Table 5: Relevant features for the brain clock of alpha oscillations in patients with Alzheimer's disease

group	EEG band	band definition	Spectral metric	brain region	hemisphere	SHAP
AD	low α	subject specific	RPD	hippocampus	right	141.6
	α 2	canonical	EPP	parietal lobe	left	81.6
	low α	subject specific	EPP	occipital lobe	right	69.7
	low α	subject specific	RPD	hippocampus	left	46.0
	-	subject specific	IAF	orbital cortex	left	44.5
	-	subject specific	IAF	operculum	right	43.3
	-	subject specific	IAF	hippocampus	left	38.6
	low α	subject specific	EPP	hippocampus	left	27.6
	-	subject specific	TF	inferior frontal gyrus	right	25.5
	low α	subject specific	RPD	parietal lobe	right	16.9
	-	subject specific	TF	operculum	left	15.6
	α 2	canonical	EPP	parietal lobe	right	11.3
	-	subject specific	IAF	operculum	left	10.3
	-	subject specific	TF	hippocampus	left	10.0
	-	subject specific	IAF	hippocampus	right	8.5
	low α	subject specific	EPP	occipital lobe	left	8.1
	high α	subject specific	EPP	hippocampus	left	4.3
	-	subject specific	IAF	occipital lobe	left	3.7
	α 2	canonical	RPD	parietal lobe	left	3.2
	low α	subject specific	EPP	operculum	left	3.2
	-	subject specific	TF	superior frontal gyrus	right	2.1
	-	subject specific	TF	orbital cortex	right	1.8
	low α	subject specific	EPP	cingulate cortex	right	1.7
	high α	subject specific	RPD	hippocampus	left	0.8
	-	subject specific	IAF	occipital lobe	right	0.5
	-	subject specific	TF	hippocampus	right	0.4
	α 2	canonical	EPP	occipital lobe	right	0.4
	high α	subject specific	EPP	parietal lobe	right	0.2
	-	subject specific	TF	superior frontal gyrus	left	0.2
	α 2	canonical	RPD	occipital lobe	right	0.2
	-	subject specific	IAF	superior frontal gyrus	right	0.1
	α 2	canonical	RPD	parietal lobe	right	0.1
	α 2	canonical	RPD	cingulate cortex	left	0.1
	-	subject specific	TF	orbital cortex	left	0.1
	low α	subject specific	EPP	parietal lobe	right	0.1

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Supplementary Table 6. Regions of interest selected for the estimation of EEG parameters

Region of interest (ROI)	Regions comprising the ROI
Orbital Gyrus	Superior, middle, and inferior orbital gyri
Inferior Frontal Gyrus	Opercular and triangular parts of the inferior frontal gyrus
Middle Frontal Gyrus	Middle frontal gyrus
Superior Frontal Gyrus	Precentral gyrus, superior, and medial superior frontal gyri, gyrus rectus, supplementary motor area
Hippocampal Regions and Amygdala	Hippocampus, para-hippocampal area, amygdala
Insula	Rolandic operculum, insula
Cingulate Cortex	Anterior, middle, and posterior cingulate
Parietal Lobe	Superior and inferior parietal gyri, angular gyrus, paracentral lobule
Temporal Lobe	Heschl gyrys, superior, middle, and inferior temporal gyri, middle and inferior temporal poles
Occipital Lobe	Calcarine fissure and surrounding cortex, cuneus, superior, middle, and inferior occipital gyri, lingual gyrus

Supplementary Table 7: Areas conforming the brain clock of α -oscillations

group	brain region	hemisphere	adjusted SHAP
HC	hippocampus	right	1.0
	hippocampus	left	0.9
	parietal lobe	left	0.6
	occipital lobe	right	0.5
	orbital cortex	left	0.3
	operculum	right	0.3
	parietal lobe	right	0.2
	inferior frontal gyrus	right	0.2
	operculum	left	0.2
	occipital lobe	left	0.1
	cingulate cortex	left	0.1
MCI	hippocampus	left	1.0
	hippocampus	right	0.9
	occipital lobe	right	0.7
	parietal lobe	left	0.5
	operculum	right	0.4
	orbital cortex	left	0.4
	inferior frontal gyrus	right	0.2
	operculum	left	0.2
	parietal lobe	right	0.2
	occipital lobe	left	0.1
	cingulate cortex	left	0.1
bvFTD	hippocampus	right	1.0
	hippocampus	left	0.8
	parietal lobe	left	0.6
	occipital lobe	right	0.5
	orbital cortex	left	0.2
	parietal lobe	right	0.2
	operculum	right	0.2
	inferior frontal gyrus	right	0.2
	operculum	left	0.2
	occipital lobe	left	0.1
AD	hippocampus	right	1.0
	hippocampus	left	0.8
	parietal lobe	left	0.6
	occipital lobe	right	0.5
	orbital cortex	left	0.3
	operculum	right	0.3
	parietal lobe	right	0.2
	operculum	left	0.2
	inferior frontal gyrus	right	0.2
	occipital lobe	left	0.1

HC: healthy controls, MCI: mild cognitive impairment, bvFTD: behavioral variant frontotemporal dementia, AD: Alzheimer's disease

Supplementary Table 8: Grouping of countries based on structural inequality levels

Relative level of structural inequality	Country	GINI coefficient
lower	Ireland	30.6
	United Kingdom	33.2
	Greece	34.6
	Italy	35.2
middle	Cuba	40.7
	Argentina	41.8
	Turkey	42.0
	Chile	44.7
higher	Colombia	52.0
	Brazil	52.6

Supplementary Table 9: One-way ANOVA and multiple comparison procedure to assess the effect of the GINI coefficient on the BAG of HC.

One-way ANOVA					
source of variation	df	ss	ms	F	p
Between Groups	2	52.980	26.490	29.219	<0.001
Residual	678	614.680	0.907		
Total	680	667.660			

Multiple Comparison Procedures (Holm-Sidak method)

Comparison for factor GINI

Comparison	Diff of Means	t	p
higher vs. lower	0.789	7.489	<0.001
middle vs. lower	0.545	5.851	<0.001
higher vs. middle	0.244	2.801	0.005

Supplementary Table 10: Two-way ANOVA and multiple comparison procedure to assess the effect of brain health (group) and GINI coefficient on the BAG.

One-way ANOVA					
source of variation	df	ss	ms	F	p
group	1	190.605	190.605	219.083	<0.001
GINI	1	69.550	69.550	79.941	<0.001
group x GINI	1	27.776	27.776	31.927	<0.001
residuals	775	674.260	0.870		
Total	778	938.440	1.206		

Multiple Comparison Procedures (Holm-Sidak method)

comparison	Diff of Means	t	p
GINI within HC	0.240	2.599	0.001
GINI within AD	1.063	9.424	<0.001
group withing middle	0.667	7.774	<0.001
group withing higher	1.490	12.649	<0.001

HC: healthy controls, MCI: mild cognitive impairment, bvFTD: behavioral variant frontotemporal dementia, AD: Alzheimer's disease

Supplementary Table 11: EEG acquisition systems and recording parameters

Country (alphabetical order)	Center	Acquisition system	number of channels	online reference electrode	online filters (Hz)	sampling rate (Hz)
Argentina	Universidad San Andrés	Biosemi Active II	128 / active	zero reference principle	0.16- 100	2048
Brazil	Universidade de São Paulo	Braintech 3.0	21 / passive	no reported	1-60	200
Chile	Universidad Adolfo Ibáñez	Biosemi Active II	128 / active	zero reference principle	0.16- 100	2048
Colombia	Universidad de Antioquia	Neuroscan Synamps 2	72 / passive	vertex, right mastoids	0.1-200	1024
Cuba	Cuban Neuroscience Center	MEDICD	64, 128 / passive	linked earlobes	0.5-50	200
Greece						
Italy	Sapienza Università di Roma	BrainVision BrainAmp	61 / passive	FCz	0.016- 1000	1000
Ireland	Trinity College Dublin	Biosemi Active II	128 / active	zero reference principle	0.1-35	512
Turkey	Izmir University of Economics	BrainVision BrainAmp	32 / passive	A1 + A2	0.03-70	500
	Istanbul Medipol University	BrainVision BrainAmp	32 / passive	A1 + A2	0.01- 250	500
United Kingdom	University of Strathclyde	Biosemi Active II	64 / active		0.1-35	512