Non-uniformity of cell density and networks in the monkey brain

Masanori Shimono[1]

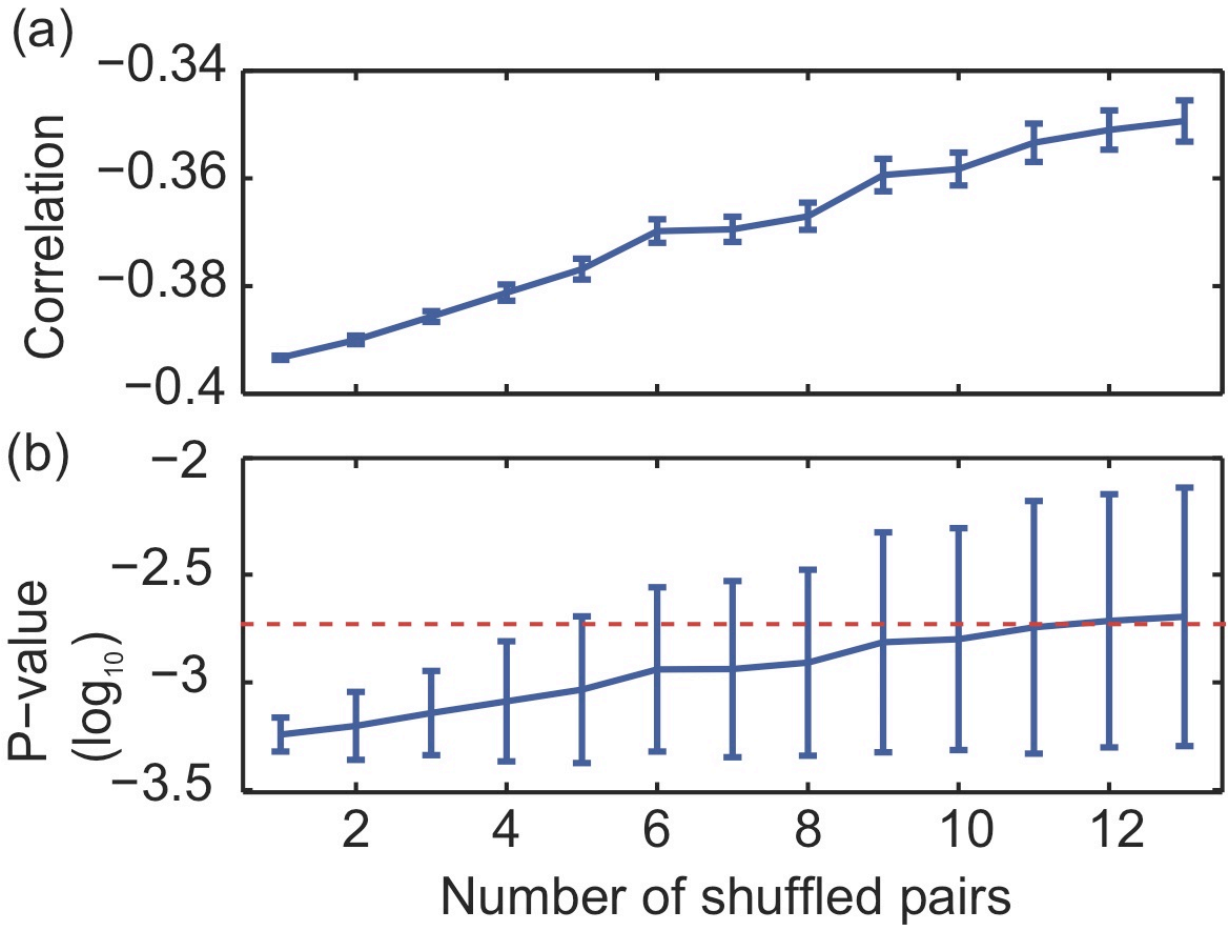
1.Dept. of Physics, Indiana University, Swain Hall West, 727 E. 3rd St., Bloomington, IN, 47405-7105, U.S.A.

Brain Regions in CoCoMac	Abbreviations	Indexes in Collins data	Module Indexes
Primary visual cortex	V1	6,9-13	1
Secondary visual cortex	V2	1,2,3	1
Third visual area	V3	5	1
Visual area V3a	V3a	8	1
Ventral Posterior Visual area	VP	16	1
Visual occipito-temporal area	VOT	20	1
Visual area 4	V4	19	1
Transitional zone of V4 abutting MT	V4t	20	1
Parieto-occipital visual area	PO	31	1
Posterior intraparietal area	PIP	31	1
Lateral intraparietal	LIP	32	3
Ventral intraparietal	VIP	32	1
Middle temporal area	MT	17	1
Medial superior temporal (dorsal)	MSTd	28	1
Medial superior temporal (lateral)	MSTl	28	1
Area 7a	A7a	32	3
Area 7b	A7b	32	2
Floor of superior temporal area	FST	17	1
Posterior inferotemporal area, ventral	PITv	21	4
Posterior inferotemporal area, dorsal	PITd	18	1
TF of the parahippocampal cortex	TF	21	4
Superior temporal polysensory area, anterior	STPa	27	4
Superior temporal polysensory area, posterior	STPp	28	3
Central inferotemporal area, ventral	CITv	21	4
Central inferotemporal area, dorsal	CITd	18	4
Anterior inferotemporal area, ventral	AITv	22	4
Anterior inferotemporal area, dorsal	AITd	18	4
Dorsal preluneate	DP	32	1
Ventral temporal polar cortex	TGV	23	4
Dorsal temporal polar cortex	TGD	23	4
Superior temporal auditory area1	TS1	23	4
Superior temporal auditory area2	TS2	23	4

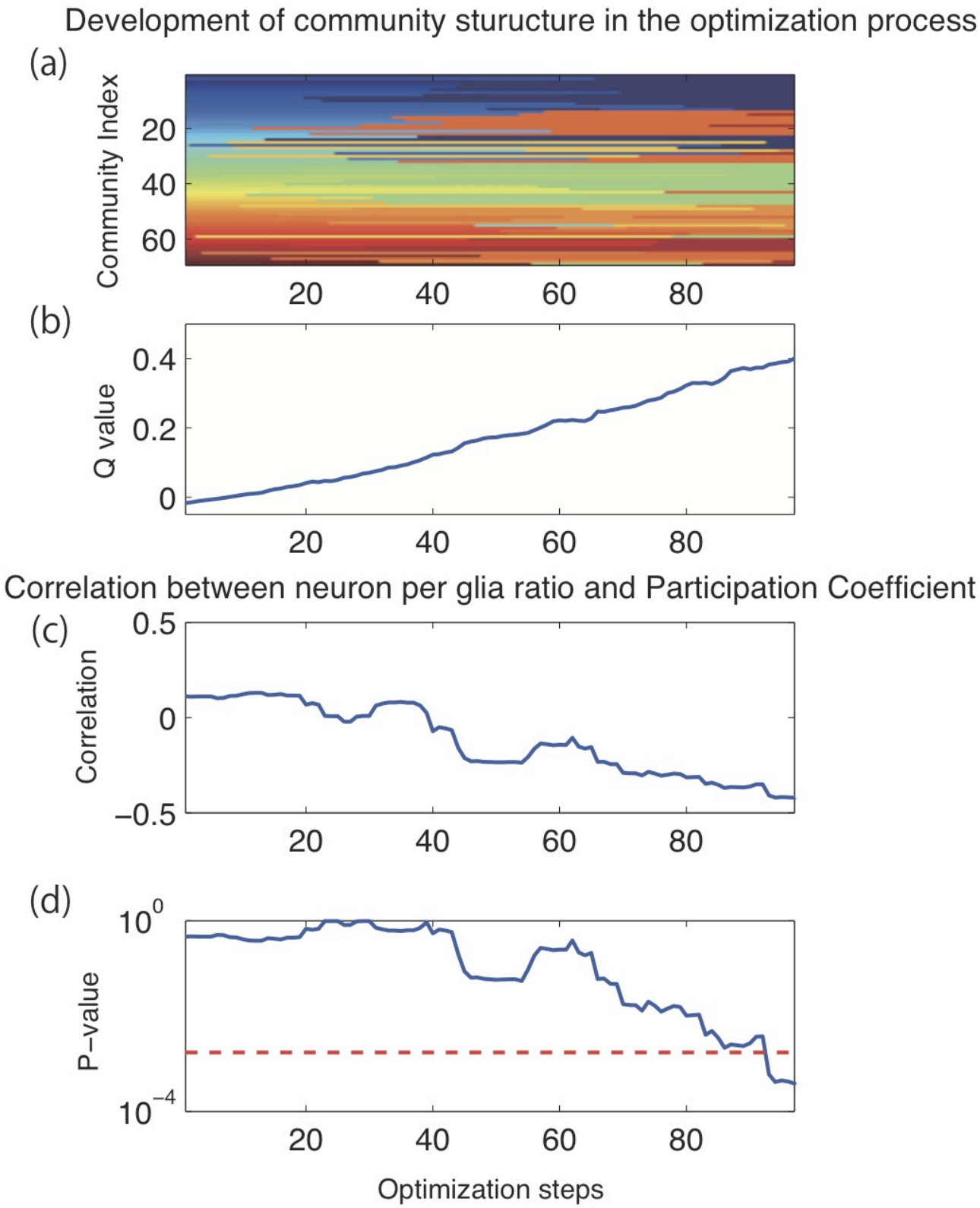
Area 35, Perirhinal cortex	A35	23	4
Entorhinal cortex	ER	23	4
Superior temporal auditory area3	TS3	28	5
TH of the parahippocampal cortex	TH	22	4
Auditory parakoniocortical area (lateral)	PaAl	25	5
Auditory parakoniocortical area (caudal)	PaAc	25	5
Auditory koniocortical area (primary)	KA	24	5
Auditory prokoniocortex	PROA	24	5
Audutiry retroinsular temporal cortex	Reit	25	5
Insula granular	Ig	35	2
Insula dysgranular	Id	35	2
Auditory area Tpt	TPT	28	5
Retroinsular cortex	Ri	32	2
Area 5 in Primary Sensory cortex	A5	31	2
Area 4, Primary motor cortex	A4	30	2
Area 3a in Primary Sensory cortex	A3a	30	2
Area 3b in Primary Sensory cortex	A3b	29a	2
Area 2 in Primary Sensory cortex	A2	29	2
Area 1 in Primary Sensory cortex	A1	29	2
Secondary somatosensory area	S2	35	2
Area 6, Premotor cortex	A6	30	2
Supplementary motor cortex	SMA	34	2
Gustatory cortex	G	35	2
Area 11	A11	26	3
Area 13	A13	26	4
Area 23, Posterior cingulate	A23	39	3
Area 24, Anterior cingulate	A24	39	3
Area 45	A45	41	3
Frontal eye field, area 8	FEF	40	3
Area 25	A25	41	4
Area 12	A12	41	4
Area 14	A14	41	2
Area 46	A46	40	3

Area 32	A32	41	3
Area 9	A9	37	3
Area 10	A10	41	3

Table S-1. Summary of the labels of the different brain regions. The first row is the list of names of the brain regions used in the CoCoMac database. The second row lists their abbreviated names. The third row is a list of the names of the brain regions used in the Collin's data set, and the fourth row lists labels of the communities detected using the community detection method.



S-2. The reduction of correlation after exchanging nodes. (a) The change of correlations between the neuron-per-nonneuron ratio and participation coefficients depending on the number of pairs of exchanged adjacent brain regions. (b) The decrease of p-value according to the change of correlation value. The average p-value passed over the significance level (red dotted line) when the exchanged number is six. The error bars are deviations from their means.



S-3. The development of a community structure. (a) The development of the segmentation between communities. The Louvain method starts from the initial condition that all nodes are separated and gradually connect between two small communities to achieve the maximum increase of the Q value. The *x*-axis is the calculation step, and the *y*-axis is the index of nodes. The color map shows

the community indices of the individual nodes. (b) The increase in Q value was dependent on the calculation steps. (c) The change in correlation between the neuron-per-nonneuron ratio and participation coefficient during the progression of the calculation step. (d) The p value also decreased according to the change in correlation. These values were significant (lower than the red line).