Supplementary Information for

The network organization of intrathalamic macroconnections compared with other forebrain divisions

Larry W. Swanson, Olaf Sporns, and Joel D. Hahn

Larry W. Swanson
Email: larryswanson10@gmail.com

This PDF file includes:

Figs. S1 and S2
Tables S1 and S2
Captions for Datasets S1 and S2
References for SI reference citations

Other supplementary materials for this manuscript include the following:

Datasets S1 and S2

www.pnas.org/cgi/doi/10.1073/pnas.1905961116

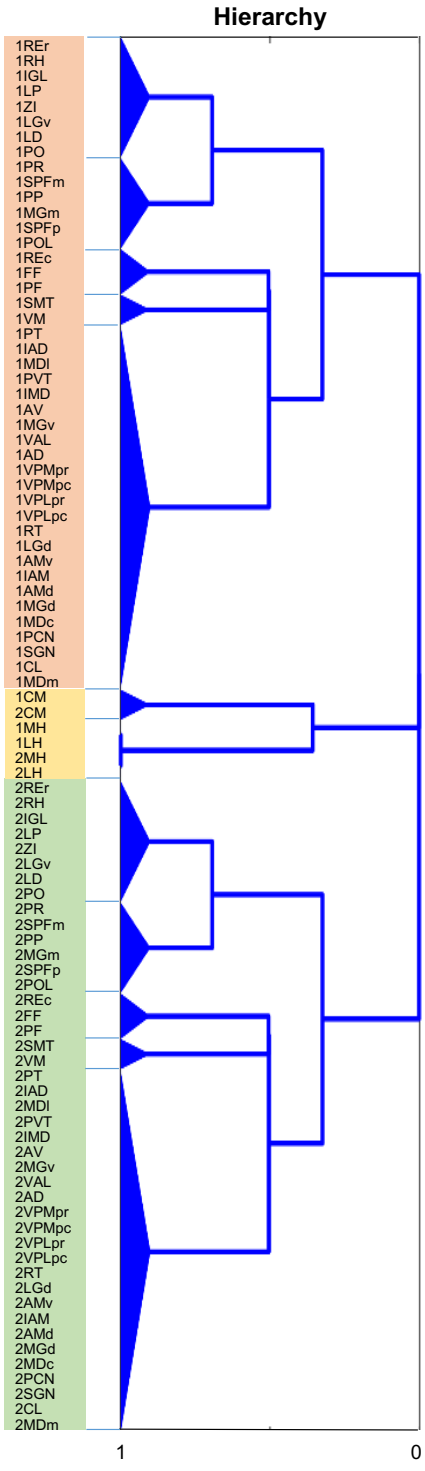
Hierarchy
1REr
1RH
1IGL
1LP
1ZI
1LGv
1LD
1PO
1PR
1SPFm
1PP
1MGm
1SPFp
1POL
1REc
1FF
1PF
1SMT
1VM
1PT
1IAD
1MDl
1PVT
1IMD
1AV
1MGv
1VAL
1AD
1VPMpr
1VPMpc
1VPLpr
1VPLpc
1RT
1LGd
1AMv
1IAM
1AMd
1MGd
1MDc
1PCN
1SGN
1CL
1MDm
1CM
2CM
1MH
1LH
2MH
2LH
2REr
2RH
2IGL
2LP
2ZI
2LGv
2LD
2PO
2PR
2SPFm
2PP
2MGm
2SPFp
2POL
2REc
2FF
2PF
2SMT
2VM
2PT
2IAD
2MDl
2PVT
2IMD
2AV
2MGv
2VAL
2AD
2VPMpr
2VPMpc
2VPLpr
2VPLpc
2RT
2LGd
2AMv
2IAM
2AMd
2MGd
2MDc
2PCN
2SGN
2CL
2MDm
1
0

Fig. S1. Subsystem hierarchical organization of the bilateral intrathalamic co-classification matrix shown in Fig. 6. Compare with hierarchical organization of the unilateral intrathalamic co-classification matrix shown in Fig. 5.

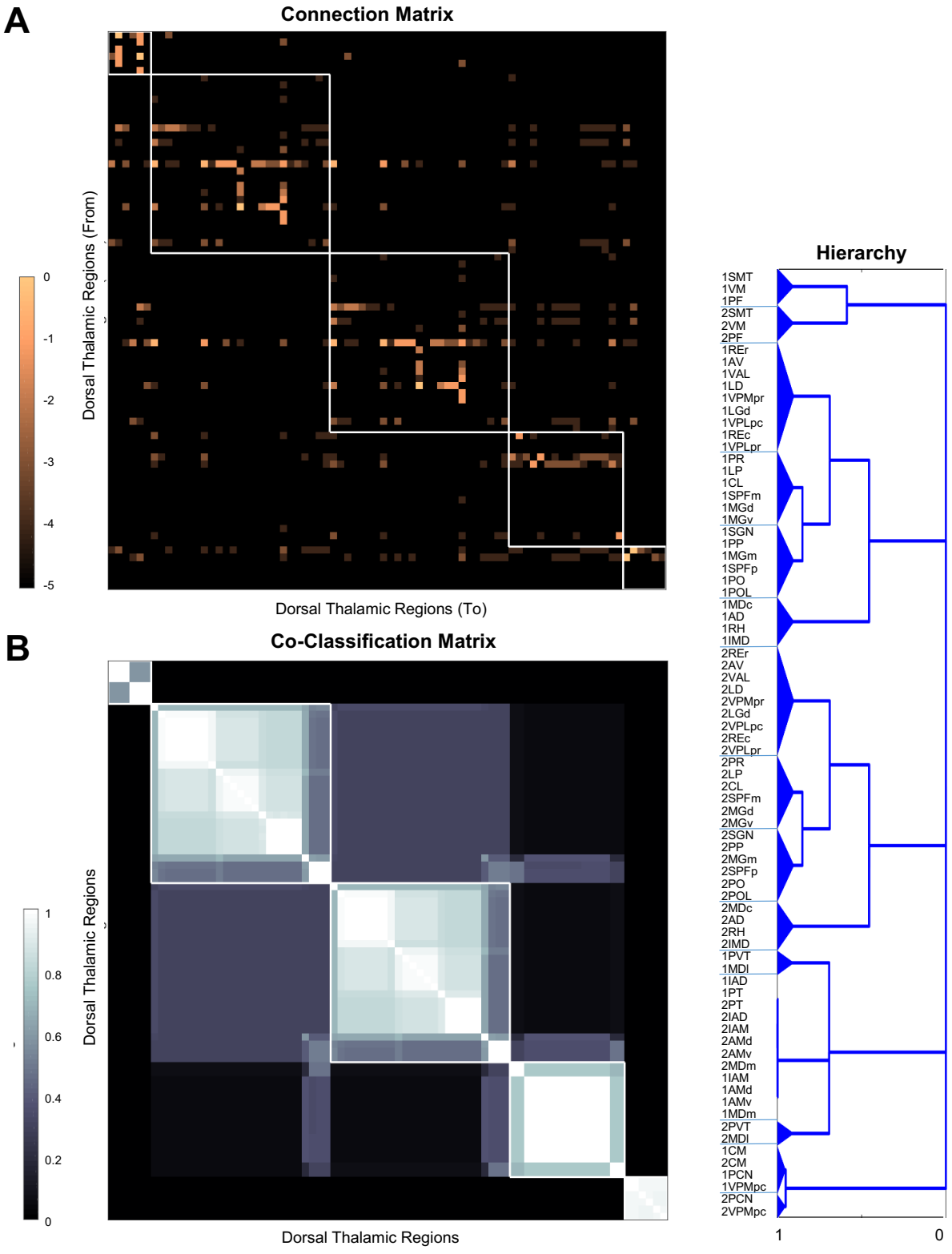
A
Connection Matrix
Dorsal Thalamic Regions (From)
Dorsal Thalamic Regions (To)
0
-1
-2
-3
-4
-5
Hierarchy
1SMT
1VM
1PF
2SMT
2VM
2PF
1REr
1AV
1VAL
1LD
1VPMpr
1LGd
1VPLpc
1REc
1VPLpr
1PR
1LP
1CL
1SPFm
1MGd
1MGv
1SGN
1PP
1MGm
1SPFp
1PO
1POL
1MDc
1AD
1RH
1IMD
2REr
2AV
2VAL
2LD
2VPMpr
2LGd
2VPLpc
2REc
2VPLpr
2PR
2LP
2CL
2SPFm
2MGd
2MGv
2SGN
2PP
2MGm
2SPFp
2PO
2POL
2MDc
2AD
2RH
2IMD
1PVT
1MDl
1IAD
1PT
2PT
2IAD
2IAM
2AMd
2AMv
2MDm
1IAM
1AMd
1AMv
1MDm
2PVT
2MDl
1CM
2CM
1PCN
1VPMpc
2PCN
2VPMpc
1
0
B
Co-Classification Matrix
Dorsal Thalamic Regions
Dorsal Thalamic Regions
1
0.8
0.6
0.4
0.2
0

Fig. S2. Connection and co-classification network matrices for the bilateral intra-dorsal thalamic (THd2) subconnectome. (*A*) Directed and weighted monosynaptic macroconnection matrix for the rat THd2 with gray matter region (nucleus or node) sequence in a modular or subsystem arrangement derived from MRCC analysis (shown in *B*). Connection weights are represented on a $\log_{10}$ scale (left). Four top-level modules are outlined in white. (*B*) Complete co-classification matrix obtained from MRCC analysis (as in *A*) for the 39 THd gray matter regions on each side of the brain. The co-classification index (left), ordering, and hierarchical arrangement are as in Fig. 5. Region abbreviations are defined in Dataset S2.

Table S1. Aggregate connection weights between the three subdivisions of the thalamus (THe, epithalamus; THv, ventral thalamus; THd, dorsal thalamus) on one side of the brain.

	To		
From	THe	THv	THd
THe	0.0375	0.0002	0.0121
THv	0.0002	0.1335	0.1018
THd	0.0001	0.0249	0.0021

Table S2. Aggregate connection weights between the three subdivisions of the thalamus (THe, epithalamus; THv, ventral thalamus; and THd, dorsal thalamus) on both sides of the brain.

Table S2. Aggregate connection weights between the three subdivisions of the thalamus (THe, epithalamus; THv, ventral thalamus; THd, dorsal thalamus) on both sides of the brain.

	To					
From	THe1	THv1	THd1	THe2	THv2	THd2
THe1	0.0375	0.0002	0.0121	0.1875	0.0002	0.0004
THv1	0.0002	0.1335	0.1018	0.0000	0.0066	0.0057
THd1	0.0001	0.0249	0.0021	0.0000	0.0001	0.0009
THe2	0.1875	0.0002	0.0004	0.0375	0.0002	0.0121
THv2	0.0000	0.0066	0.0057	0.0002	0.1335	0.1018
THd2	0.0000	0.0001	0.0009	0.0001	0.0249	0.0021

Additional dataset S1 (separate Excel file)

The complete collated macroconnection report dataset used for network analysis. [link] The sequence of tabulated connection reports follows the topographic arrangement of regions in a standard rat brain atlas (2). When multiple connection reports for a connection of interest were found, the one considered to be most valid was selected for network analysis as

detailed previously (1). Abbreviations for pathway tracers: ARGM, autoradiographic method; BDA, biotinylated dextran amine (M.W. 3,000 or 10,000); CTB, cholera toxin B subunit; CTB-gold, CTB conjugated to colloidal gold; CTB-HRP, CTB conjugated to horseradish peroxidase; HRP, horseradish peroxidase; PHAL, *Phaseolus vulgaris*-leucoagglutinin; rSINVirus, recombinant Sindbis virus; rVSVirus, recombinant vesicular stomatitis virus; WGA, wheat germ agglutinin; WGA-HRP-Gold, WGA conjugated to horseradish peroxidase.

Additional dataset S2 (separate Excel file)

Data matrices in Microsoft Excel (spreadsheet) file format for the connections of the rat thalamus. [link] Data were extracted from connection reports in the primary literature. The Excel file has 5 worksheets. The first worksheet provides an annotated list of connection report weight categories, their abbreviations, and correspondence between these terms and their assigned numerical values for collated (raw) and binned data. Worksheets 2-5 provide rat thalamus macroconnection data in binned and collated (raw) format arranged by subsystem (modularity) for the bilateral thalamic subconnectome (TH2) (see also Fig. 1), and for the unilateral thalamic subconnectome (TH1) (see Fig. 5). Matrix directionality is from y-axis to x-axis.

References for Supporting Information

1. Swanson LW, Hahn JD, Jeub LGS, Fortunato S, & Sporns O (2018) Subsystem organization of axonal connections within and between the right and left cerebral cortex and cerebral nuclei (endbrain). *Proc Natl Acad Sci USA.* 115(29):E6910-E6919.

2. Swanson LW (2018) Brain maps 4.0—Structure of the rat brain: an open access atlas with global nervous system nomenclature ontology and flatmaps. *J Comp Neurol* 526(6):935-943.