

Supporting Information

Swanson and Bota 10.1073/pnas.1015128107

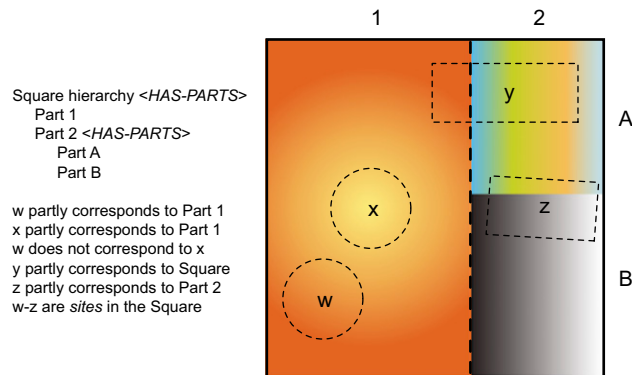


Fig. S1. Difference between *PART-OF* and *partly corresponding* relationships. In a hypothetical foundational model, the square (*Right*) is divided into parts 1 and 2, and part 2 is subdivided into parts A and B. This is a classic spatial hierarchy that for the sake of illustration is taken as complete, with an obvious set of *PART-OF* relationships (and the inverse *HAS-PART* relationships) (*Left*). Note that each of the four standard parts is heterogeneous, as is generally true for topographic divisions, gray matter regions, and white matter tracts of the nervous system (Fig. 1). There are four other outlines (w–z) in the foundational model square and they *partly correspond* in different ways (*Left*) to the standard parts. Partly corresponding terms are a special, separate category. Each partly corresponding term is associated with the hierarchy standard term immediately above it (*Left*) but the partly corresponding term is not an integral feature of the hierarchy because its border is considered arbitrary relative to the parts borders. In addition, sites w and x are topologically *included* in part 1, whereas sites y and z topologically *overlap* two adjacent parts. Because each standard part is heterogeneous, different sites within a particular part (in this example, sites w and x) are different. Outlines w–z are instances of *sites* [see main text and *SI Text* for Foundational Model of Connectivity (FMC) controlled vocabularies for definition of *site*].

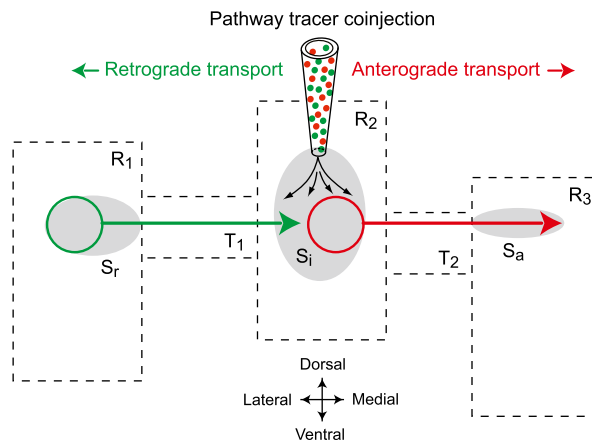


Fig. S2. Difference between connection and pathway. Basic terms for describing the results of experimental connection analysis experiments are contrasted with the FMC conceptual framework. The results of a single experiment, here the coinjection of an anterograde tracer and a retrograde tracer, demonstrate labeled pathways, which are the labeled parts of connections between nodes. Conceptually, region 1 (R_1) connects through tract 1 (T_1) with region 2 (R_2) that in turn connects through tract 2 (T_2) with region 3 (R_3). Experimentally, the tracer coinjection site (S_i) is centered in the middle of R_2 and generates a retrograde labeling site (S_r) in the dorsal half of R_1 and an anterogradely labeled pathway (red) runs near the dorsal edge of T_2 . It is critical to realize that in this example, macroconnections, not mesoconnections, are demonstrated; that is, connections between regions (treated as black boxes), not neuron types, are inferred (Fig. 6B). This figure is a bridge between the FMC proposed here and a consideration of experimental connective methodology and its application to the FMC.

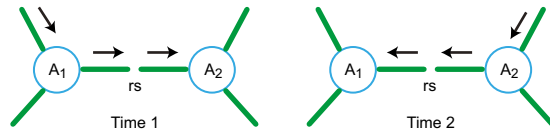
Nervous System Structural Elements

Topographic macroarchitecture (gross anatomy)

Topographic divisions	
Nerve net	
Marginal ganglia	
Nerve ring	
Circumoral nerve ring	
Radial nerve cord	
Central nervous system	
Central nerve cord	
Central nerve cord trunk	
Central longitudinal communicating branch	
Central transverse communicating branch	
Central ganglia	
Invertebrate brain	
Supraesophageal ganglion	
Ventral ganglia	
Circumenteric nerve ring	
Cerebrospinal axis	
Vertebrate brain	
Forebrain	
Endbrain	
Cerebral cortex	
Cerebral nuclei	
Interbrain	
Thalamus	
Hypothalamus	
Midbrain	
Tectum	
Tegmentum	
Rhombicbrain	
Hindbrain	
Pons	
Cerebellum	
Medulla	
Spinal cord	
Peripheral Nervous System	
Peripheral nerve cord	
Peripheral nerve cord trunk	
Peripheral longitudinal communicating branch	
Nerves	
Invertebrate nerves	
Craniospinal nerves (vertebrate)	
Cranial nerves	
Spinal nerves	
Spinal nerve roots	
Spinal nerve trunk	
Spinal nerve branches	
Autonomic nerves (vertebrate)	
Paravertebral nerves	
Prevertebral plexuses	
Prevertebral nerves	
Terminal plexuses	
Terminal autonomic nerves	
Peripheral Ganglia	
Invertebrate peripheral ganglia	
Craniospinal ganglia (vertebrate)	
Cranial nerve ganglia	
Spinal nerve ganglia	
Autonomic ganglia (vertebrate)	
Paravertebral ganglia	
Prevertebral ganglia	
Terminal ganglia	
Supporting elements	
Meninges	
Dura	
Arachnoid	
Pia	
Ventricular-subarachnoid space	
Lateral ventricles	
Third ventricle	
Cerebral aqueduct	
Fourth ventricle	
Central canal	
Subarachnoid space	

Fig. S3. Table of nervous system topographic macroarchitecture (gross anatomy), expanding on the lower levels of Fig. 1 (Left).

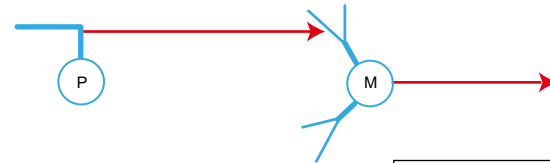
A. Two amacrine neurons (nerve net)



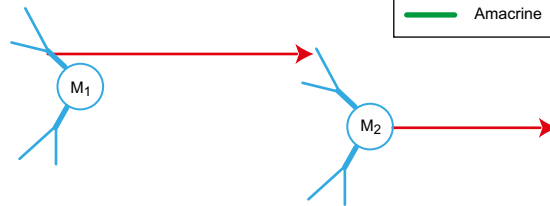
B. Bipolar and unipolar neurons (invertebrate)



C. Pseudounipolar and multipolar neurons (vertebrate)



D. Two multipolar neurons (vertebrate)



KEY:	
—	Cell body
—	Dendrite
—	Axon
—	Amacrine

Fig. 54. Some major neuron configurations. (A) Two amacrine neurons in a nerve net. (B) Bipolar and unipolar neurons in invertebrate. (C) Pseudounipolar neuron and multipolar neuron in vertebrate. (D) Two multipolar neurons in vertebrate.

Other Supporting Information Files

[SI Text \(DOC\)](#)