Supporting Information

Swanson and Bota 10.1073/pnas.1015128107

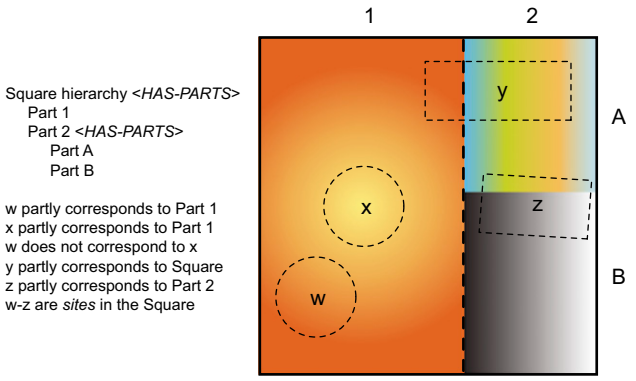

Fig. S1. Difference between *PART-OF* and *partly corresponding* relationships. In a hypothetical foundational model, the square (*Right*) is divided into parts 1 and 2, and part 2 is subdivided into parts A and B. This is a classic spatial hierarchy that for the sake of illustration is taken as complete, 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*].

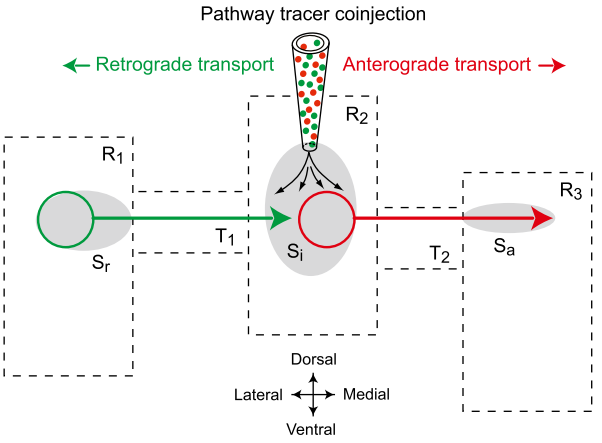

Fig. S2. Difference between connection and pathway. Basic terms for describing the results of experimental connection analysis experiments are contrasted with the FMC conceptual framework. The results of a single experiment, here the coinjection of an anterograde tracer and a retrograde tracer, demonstrate 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 anterograde labeling site (S_a) in the dorsal third of R_3. The retrogradely labeled pathway (green) courses through the middle of T_1 and the 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. 6*B*). This figure is a bridge between the FMC proposed here and a consideration of experimental connectional methodology and its application to the FMC.

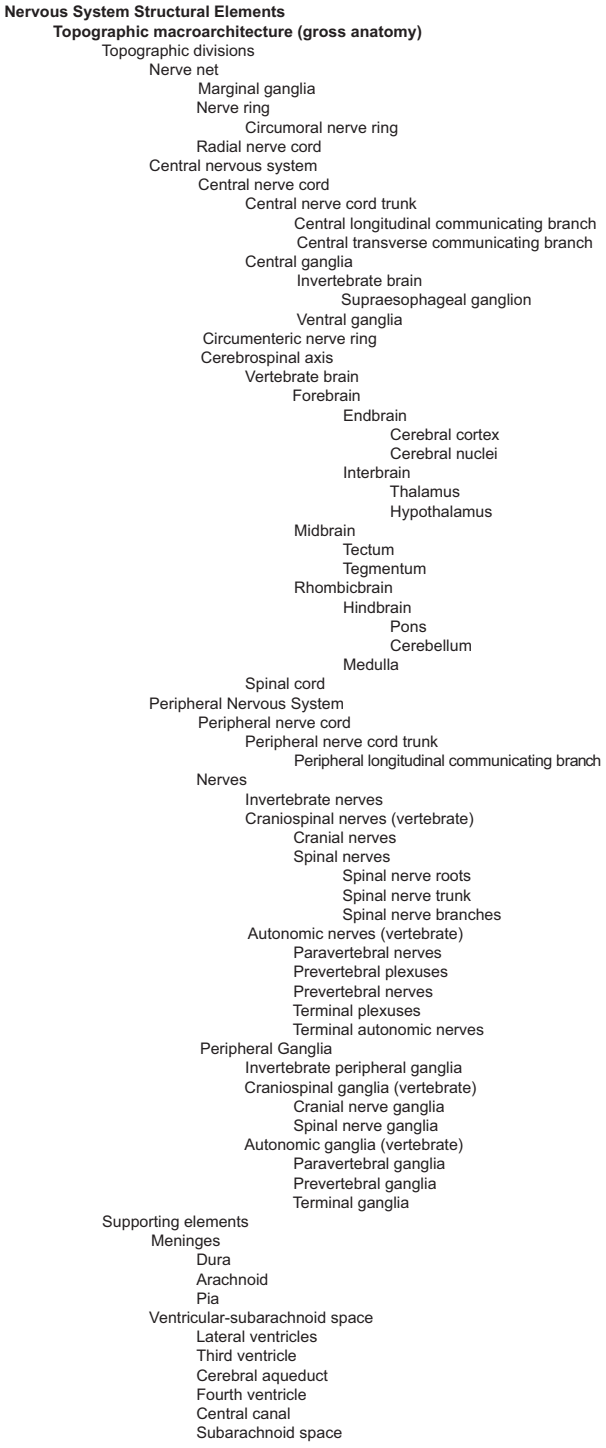

Fig. S3. Table of nervous system topographic macroarchitecture (gross anatomy), expanding on the lower levels of Fig. 1 (*Left*).

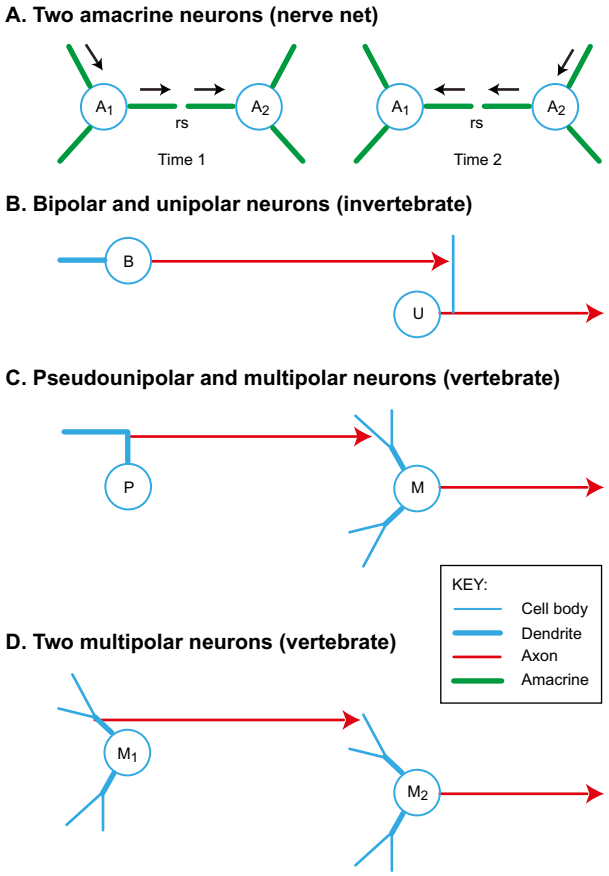

Fig. S4. Some major neuron configurations. (*A*) Two amacrine neurons in a nerve net. (*B*) Bipolar and unipolar neurons in invertebrate. (*C*) Pseudounipolar neuron and multipolar neuron in vertebrate. (*D*) Two multipolar neurons in vertebrate.

Other Supporting Information Files

SI Text (DOC)