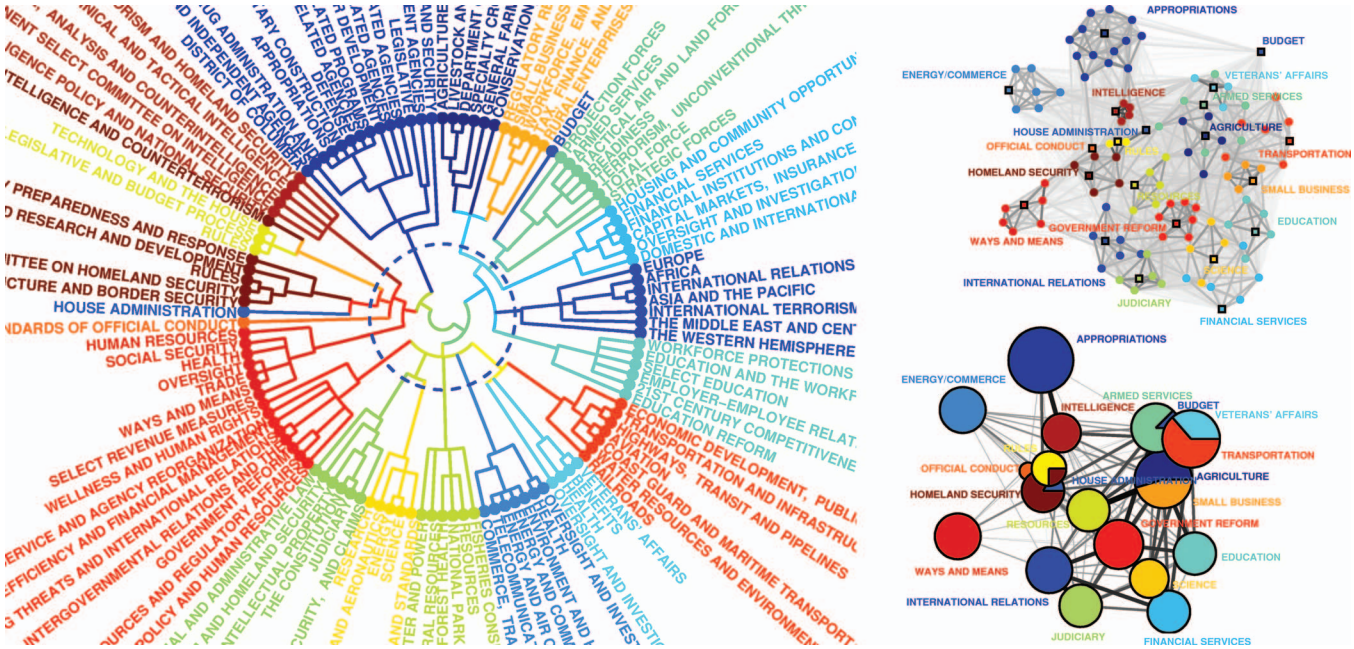

Community structure in the U.S. House of Representatives

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Much of the work involved in making United States law is performed by Congressional committees and subcommittees before bills reach the floors of the Senate and House of Representatives. Committee memberships can be viewed as a social network, and the relationships between legislators appointed to common committees can be grouped into various hierarchical levels: individuals, subcommittees, standing (and select) committees, groups of committees, and the entire floor. Community detection methods[1] from network theory[2] have been successful not only at replicating this hierarchical organization but also at uncovering additional structural features of committee networks. One example, illustrated here for the 108th House (2003-2004), is the strong overlap between certain committees,[3,4] such as the Rules Committee and the Select Committee on Homeland Security (shown, respectively, in yellow and maroon near the nine o'clock position of the left figure).

To study the 108th House's community structure, we begin with a bipartite network in which the two types of nodes are Representatives and (sub)committees, with edges representing the assignment of a Representative to a (sub)committee. We then compute a one-mode projection onto the committees, with edges between committees indicating common Representatives (depicted graphically on the upper right, with nodes colored by parent committee and edges shaded according to connection strength). Edges are weighted according to *normalized interlock*, the ratio of the number of common Representatives between two (sub)committees to that expected if (sub)committees of the same sizes had randomly assigned memberships.

Different community-detection algorithms[3,4] can be used to construct trees or "dendrograms" like that shown in the left figure (again colored by parent committee). The dashed dividing ring indicates a partition with a high "modularity": the set of communities at this level of organization is depicted in the lower right figure, in which each community is a node (divided in pie-chart fashion according to its committee composition). The weights of the edges (indicated using line thickness and shading) represent the connection strength between the different communities.

Studies like these indicate that network theory can be of substantial use in uncovering collaborative structure in political bodies such as the U.S. Congress, without requiring input in the form of political opinions or judgments by the researcher.

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