1096-05-1587 **Georgia Benkart*** (benkart@math.wisc.edu), Department of Mathematics, University of Wisconsin-Madison, 480 Lincoln Drive, Madison, WI 53706. *Walking on Graphs the Representation Theory Way.*

How many walks of n steps are there from point A to point B on a graph? Often finding the answer involves clever combinatorics or tedious treading. But if the graph is the representation graph of a group, representation theory can facilitate the counting and provide much insight. The simply-laced affine Dynkin diagrams are representation graphs of the finite subgroups of the special unitary group SU(2) by the celebrated McKay correspondence. These subgroups are essentially the symmetry groups of the platonic solids, and the correspondence has been shown to have important connections with diverse subjects including mirror symmetry and the resolution of singularities. Inherent in McKay's correspondence is a rich combinatorics coming from the Dynkin diagrams. Some of the ideas involved in seeing this go back to Schur, who used them to establish a remarkable duality between the representation theories of the general linear and symmetric groups. There is a similar duality between the SU(2) subgroups and certain algebras that enable us to count walks and solve other combinatorial problems. In this case, the duality leads to connections with the Temperley-Lieb algebras of statistical mechanics, with partitions, with Catalan numbers, and much more. (Received September 16, 2013)