1050-05-58 **Mikhail H Klin**, **Dale M Mesner** and **Andrew J Woldar*** (andrew.woldar@villanova.edu), Department of Mathematical Sciences, Villanova University, Villanova, PA 19085. *The Combinatorics of Transitive Extensions.*

If (H, Ω) is a permutation group then H admits natural actions on the sets Ω^k, $\Omega^{\{k\}}$ of ordered and unordered k-tuples, respectively. Hence these sets partition into H-orbits. We propose an algebraic calculus for partitions of Ω^k, $\Omega^{\{k\}}$ which serves to approximate H-orbit partitions in pure combinatorial terms. In this sense we attempt to formulate combinatorially what it means for a structure to be highly symmetric without saying that its symmetry groups have the property of being highly transitive. Our motivation stems from the way in which association schemes analogously approximate 2-orbits of transitive permutation groups (this is the case $k = 2$). New combinatorial structures are defined, and results which apply these structures to the problem of transitive extension are provided. (Received February 22, 2009)