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Symmetic group representations and Howe duality

Let $V_r = \mathbb{C}\{v_1, v_2, \ldots, v_r\}$ be the module acted on by both $S_r \subseteq Gl_r$. Schur-Weyl duality is the pair of groups (Gl_n, S_k) are mutually commuting when they act on the k-fold tensor of V_n, $T^k(V_n)$. It is a result of Jones that the partition algebra is the algebra of elements which commute when S_n acts on $T^k(V_n)$. In analogy, Howe duality is that the pair (Gl_n, Gl_k) are mutually commuting groups when they act on the r-fold symmetric tensor of $V_n \otimes V_k$, $S^r(V_n \otimes V_k)$. By looking at characters of the symmetric group as symmetric functions we are able to define an algebra of multiset partitions that is the commutant of S_n when acting on $S^r(V_n \otimes V_k)$. This is the algebra that takes the place of the partition algebra in the case of Howe duality instead of Schur-Weyl duality.

This research is joint work with Rosa Orellana.