

Traces of random elements in matrix groups, with distributions induced by words

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Fix a word w in the free group on r generators. If $G < GL(d, C)$ is any finite or compact complex matrix group, pick r elements g_1, \dots, g_r at random from G , and evaluate $w(g_1, \dots, g_r)$ to obtain a random matrix in G . We study, among others, the expected trace of this random matrix. I will survey what is known regarding different groups, such as $U(N)$, $O(N)$, $Sp(N)$, $Sym(N)$, $GL(N, F_q)$ and generalized permutation groups. I will mention some of the motivations, discuss the main questions, and stress recurring features.

This is based on joint works with Michael Magee, Ori Parzanchevski and Danielle West.