Title: On singularity properties of word maps and applications to random walks on compact p-adic groups.

Abstract: Given a word w in a free group F_r on a set of r elements, and a group G, one can associate a word map w:G^r-->G. When G is compact, w induces a natural probability measure on G, and one can study the corresponding random walk. We study the collection of random walks on SLn(Z/p^kZ) induced by w, as p,k and n vary.
It turns out that various mixing properties of these random walks can be characterized by the geometry of the fibers of the word maps w:SLn(C)^r-->SLn(C), and their concatenations (also called convolutions) w*w*...*w:SLn(C)^rt-->SLn(C). When fixing k=1, and running over p and n, the corresponding random walks are essentially controlled by the dimensions of the fibers. When running over p,n and k, the singularities of w come into play.
We show that word maps on semisimple Lie groups and Lie algebras have nice singularity properties after sufficiently many self-convolutions (with bounds depending only on the word). As a consequence, we obtain some uniform results on the above collection of random walks.

Based on a joint work with Yotam Hendel.