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Random semigroups in solvable linear groups

Let G be a finitely generated solvable subgroup of $GL_n(\mathbb{C})$ with a connected Zariski closure, and let μ be a probability measure on G whose support generates G as a semigroup. By a theorem of Rosenblatt, if G is not virtually nilpotent then it contains a non-abelian free semigroup. We will prove a probabilistic generalization of this result, namely, that under some necessary assumptions on the underlying measure μ , if $(X_n)_{n \geq 1}$ and $(Y_n)_{n \geq 1}$ are independent μ -random walks on G , then the pair (X_n, Y_n) generates a non-abelian free semigroup with probability approaching 1 as $n \rightarrow \infty$.