The linear dimension of a group action

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Two elementary ways of representing a group G are as either a group of permutations acting on a set Ω, or as matrix group. Combining these two points of view, one may consider a *linear representation of a group action*, that is, a linear representation of G acting naturally on a vector space V with the property that the action of G on Ω is equivalent to the action of G on some subset of V. Recently, D'Alconzo and Di Scala studied the smallest dimension of such a linear representation, which they called the *linear dimension of the group action*. Their interest in this concept arose from an application to cryptography.

In this talk, I will give an overview of some recent results on the linear dimension of a group action. In particular, I will discuss the implications of faithfulness, (in)transitivity and (im)primitivity on the linear dimension of a group action. Furthermore, I will present results on the linear dimension for some particular families of primitive groups, and explain a connection to the theory of permutation modules.